

A revision of *Cothurnia* (Ciliophora: Peritrichida) and its morphological relatives

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SYNOPSIS. The loricate peritrich genera *Cothurnia*, *Cothurniopsis*, *Cyclodonta* and *Dimorphocothurnia* are revised and a key to the constituent species of each is given. Several species are synonymised or transferred to other genera and one, *Cothurnia felinska*, is erected. Four closely related genera, *Baikalotheca*, *Semicothurnia*, *Tesnotheca* and *Daurotheca* are discussed. All extant species are described and figured.

INTRODUCTION

In recent years four genera belonging to the family Vaginicolidae have been taxonomically revised, namely *Pyxicola* (Trueba, 1978), *Thuricola* and *Pseudothuricola* (Trueba, 1980), and *Platycola* (Warren, 1982). The present publication aims to extend the revision of the Vaginicolidae to those genera in which the loricas are held erect on an external stalk, and which lack a special valve or possess only a simple means of closing the aperture (*Cothurniopsis*). The major genus dealt with here is *Cothurnia* Ehrenberg, 1831, a well known genus that contains a large number of nominal species. Many species of *Cothurnia* have previously been transferred to other genera but until recently no check list of those remaining was available, thus making it difficult for the taxonomist and ecologist to identify them. In this paper *Cothurnia* and three other closely related genera, *Cothurniopsis*, *Cyclodonta* and *Dimorphocothurnia*, are taxonomically revised. A key to species and a check list of nominal and extant species of each genus are also provided.

GENERAL MORPHOLOGY AND TAXONOMIC CHARACTERS

Morphology

Accounts of the biology and morphology of genera belonging to the family Vaginicolidae were given by Kralik (1961),

Trueba (1978, 1980) and Warren (1982), so it is sufficient here to give a short summary highlighting those features common to the cothurnids.

Figure 1 shows the main morphological features of a typical species of *Cothurnia*. It consists of a lorica which has an aperture at the anterior end, a stalk at the posterior end and contains either one or two zooids. The zooids are typically cylindrical or trumpet-shaped and when relaxed may extend far beyond the aperture, but when contracted withdraw completely within the lorica. Zooids are attached to the base of the lorica either directly by means of one or two non-contractile stalks, or by a series of membranes (e.g. *Cyclodonta*).

The lorica is attached to its substrate by a non-contractile external stalk. In many species the stalk appears to be smooth and comparatively featureless, while others possess lines or stripes which run longitudinally down the stalk. Stalks possessing such stripes have been described as 'fibrillar' (Felinska, 1965) or 'striated' (Lang, 1948). Examination by TEM reveals that the stalk is bounded by an outer limiting membrane and contains tubules arranged in cylindrical groups ('Tubular Units') within a microfibrillar matrix (Vogelbein and Thune, 1988). This is broadly consistent with the findings of Randall and Hopkins (1962) who reported that the longitudinal stripes observed in the non-contractile stalks of aloricate peritrichs are also due to tubular structures in the stalk matrix. In this revision, these lines shall be referred to as longitudinal striae. Transverse folds or furrows may also be present on the stalk surface. In some species the external stalk penetrates the lorica wall via a special tube at the posterior end (Banina and

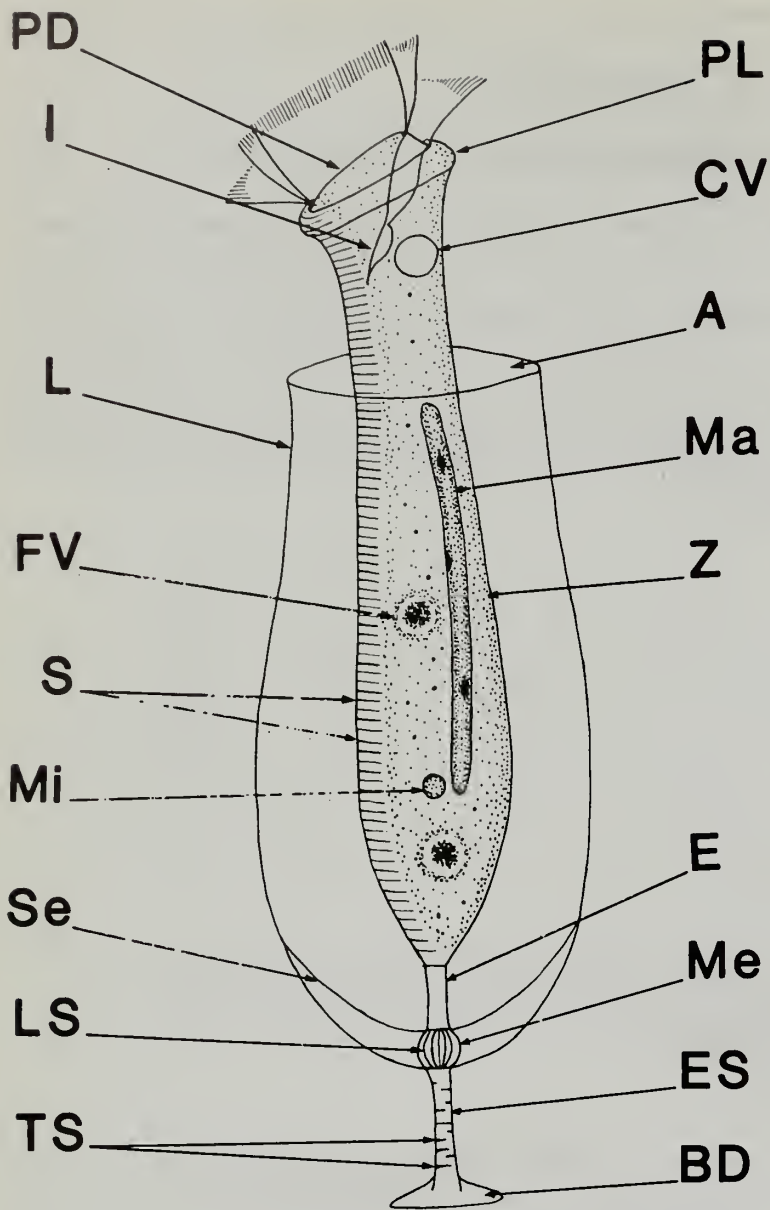


Fig. 1 A generalised *Cothurnia* showing the principal morphological features. A—aperture; BD—basal disc; CV—contractile vacuole; E—endostyle; ES—external stalk; FV—food vacuole; I—infundibulum; L—lorica; LS—longitudinal striae; Ma—macronucleus; Me—mesostyle; Mi—micronucleus; PD—peristomial disc; PL—peristomial lip; S—striations; Se—septum; TS—transverse striae/folds; Z—zoid.

Polyakova, 1977). No tube was observed by Vogelbein and Thune (1988).

At its point of attachment to the substrate the stalk is flared forming the basal disc. The basal disc rests on a layer of adhesive material which extends up to 10 μ m beyond the disc edge. The adhesive is thought to be secreted during the process of attachment to the substrate (Vogelbein and Thune, 1988).

In many cothurnids the lorica contains an extra layer of material forming an internal lining or septum. The septum is most easily seen in the posterior region where it encloses a space at the base of the lorica. In these cases, the zoid is attached to the base of the lorica via a non-contractile middle stalk or 'mesostyle'. The mesostyle is usually short and broad with conspicuous longitudinal striae. Another stalk, the endostyle, may also be present and connects the zoid either to the lorica or (when present) to the septum. The endostyle is usually short and slender.

Except in *Cothurniopsis*, there is no mechanism of closing

the aperture of the cothurnid lorica. In *Cothurniopsis* the border of the aperture is pliable and folds in to close the aperture when the zoid contracts. According to Stokes (1893) there do not appear to be any special structures involved, but rather the border closes passively as a result of the contraction of the zoid. The precise mechanism by which the aperture closes has yet to be elucidated and is therefore considered a doubtful generic character. Nevertheless, until a redescription is available, *Cothurniopsis* remains a separate genus.

Cothurnids are found in fresh, brackish and marine waters and have a cosmopolitan distribution. They have been recorded on plant, animal (commonly as epizoids of Crustacea) and inanimate substrates. They are not generally regarded as parasitic *sensu stricta*.

Taxonomic characters

Like most other peritrich groups, it is comparatively easy to characterise cothurnid genera but difficult to identify individual species. Many species have only been described once and, in some cases, descriptions were based on poorly fixed or unhealthy specimens. Consequently, important taxonomic data are unavailable for several taxa. The characters used as a basis for this revision are as follows.

Lorica shape

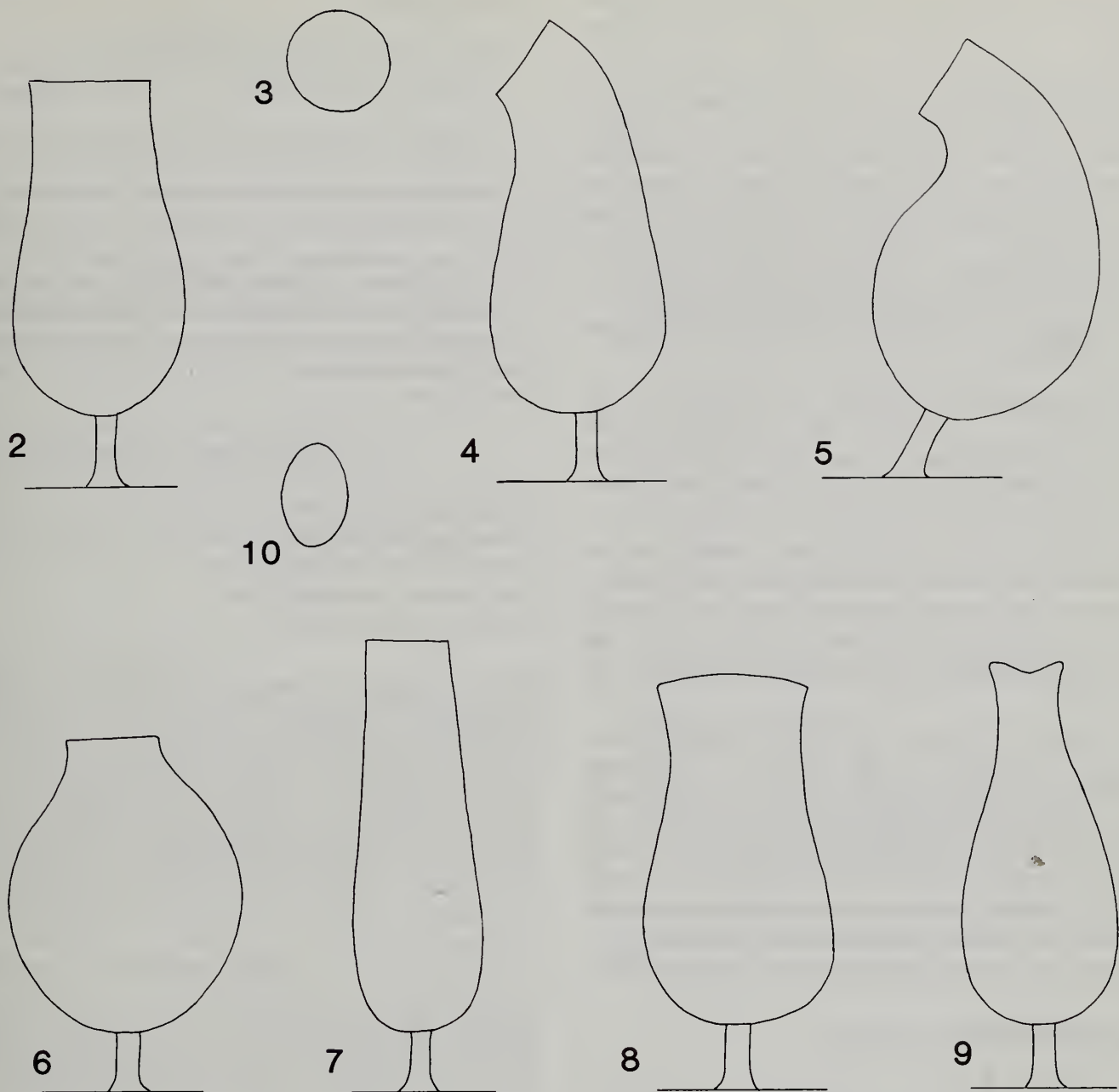
The dominant feature used for classifying cothurnids, and indeed vaginicolids in general, is the shape of the lorica. Identification keys published by Kahl (1935), Wailes (1943) and Stiller (1971) rely extensively on lorica shape for separating species. Two advantages of the lorica are, (i) it is unaffected by fixation or other methods of preservation, and (ii) it has been described for every known species. Nevertheless, opinions differ over the usefulness of lorica shape as a taxonomic character since variability is well documented (Kralik, 1961; Trueba, 1980; Warren, 1982).

The cothurnid lorica is typically cylindrical in shape with a rounded, often bulbous posterior end (Fig. 2). There is an aperture at the anterior end that is circular when viewed from above (Fig. 3). One or more clefts may be present in the aperture border. The main lorica axis is normal to the substratum and extends in straight line from the point of attachment to the external stalk. The aperture is usually at right angles to the main lorica axis although in some cases the neck just below the aperture is curved tilting the aperture obliquely to the main lorica axis (Fig. 4). Occasionally, the whole lorica may be curved (Fig. 5).

The lorica may be, (i) compressed or elongated along the main lorica axis resulting in oblate (Fig. 6) or prolate (Fig. 7) forms, or (ii) compressed in a plane at right angles to the main lorica axis (Figs 8 & 9) producing dorso-ventral flattening (Precht, 1935). Variations of the first type are readily observed, but dorso-ventral compression becomes apparent only if the lorica is viewed either from above, or from both the dorso-ventral and lateral aspects (Fig. 10). Most descriptions of cothurnids are based on observations from one direction only. Yet with all its limitations, the shape of the lorica remains a useful taxonomic character.

Lorica size

The dimensions most commonly used in species diagnoses are lorica length, maximum lorica width, and width of the



Variations in shape of cothurnid loricas (following the terminology of Precht, 1935). **Fig. 2** Normal lorica. **Fig. 3** Normal aperture viewed from above. **Fig. 4** Lorica with a curved neck. **Fig. 5** Curved lorica. **Fig. 6** Oblate lorica. **Fig. 7** Prolate lorica. **Figs 8–10** Dorso-ventrally compressed lorica, fig. 8 ventral view, fig. 9 lateral view, fig. 10 aperture viewed from above.

aperture. Ideally several individuals should be measured and the range of variation given. Among other peritrichs it has been suggested that the ratio of length: width is a more meaningful character than size alone (see Warren, 1987), and this may also prove to be the case for cothurnid loricas.

Stalks

All cothurnids possess a non-contractile external stalk attaching the lorica to the substratum. Some authors (Entz, 1884; Jankowski, 1985) have suggested that the size of the stalk and the presence of transverse folds on its surface are generic characters. In this revision stalk size and surface folding are not employed at the generic level although they are used for separating species. A few species appear to have a special tube at the posterior end of the lorica through which the external stalk penetrates the lorica wall (Banina and Polyakova, 1977).

Mesostyles and endostyles are frequently included in

descriptions of cothurnids and have long been recognised as useful characters for separating species. Jankowski (1985) suggested that the presence or absence of mesostyles and endostyles should be regarded as generic characters although acceptance of this decision must await further studies.

Zooids

The taxonomy of aloricate peritrichs is based largely on characters relating to the zooid (Foissner, 1981; Warren, 1987), frequently omitted from species descriptions of cothurnids. Descriptions available are often from studies made on fixed, contracted cells yielding information of limited value. The following zooid characters are useful; size and shape of zooid, peristomial lip, disc and macronucleus; position within zooid of contractile vacuole; number and spacing of pellicular striations. However, the following points should be noted with reference to these characters.

i) Zooid size; the proportion of the total zooid length which extends beyond the aperture may be more significant than size alone.

ii) Size and shape of peristomial lip and disc. Felinska (1965) suggested that the shape of the disc is an important taxonomic character since it 'has no transitory forms and does not undergo modifications', and divided thirteen species of *Cothurnia* into two groups—those with convex discs and those with flat, oblique discs. While the shape of the disc is probably a useful character in healthy peritrichs it should be noted that, among aloriculate forms at least, the shape of the disc varies in response to changes in environmental conditions (see Warren, 1987).

iii) Position within zooid of contractile vacuole (CV). The CV often lies either in or just below the peristomial region although in some descriptions its position is described in relation to the infundibulum. If, however, the infundibulum is short or orientated obliquely, differences may be subtle.

iv) Size and shape of macronucleus. Entz (1884) cited the shape of the macronucleus as one of the principal differences between *Cothurnopsis* (compact macronucleus) and *Cothurnia* (band-like or vermiform macronucleus). In this revision the macronucleus is employed as a taxonomic character at the species level only.

v) Pellicular striations. Biometric analysis of pellicular striations are used increasingly in the taxonomy of aloriculate peritrichs (Foissner, 1979, 1981; Foissner and Schiffmann, 1974, 1975), although few studies of this type have been carried out on loricate peritrichs. Nevertheless it is usually possible to determine whether the striations are widely spaced (clearly visible) or narrow spaced (fine or inconspicuous), and whether the ribbing between the striations is convex, concave or normal (Foissner and Schiffmann, 1975).

Colony and pseudocolony formation

Among the vaginicolids there are typically either one or two zooids per lorica, although in some genera examples of three or even four zooids per lorica have been reported (Kralik, 1961). Jankowski (1985) suggested that the presence of more than one zooid in each lorica represents a colony, and that coloniality should be regarded as a generic character among loricate peritrichs in the same way as it is among the aloriculates. Unfortunately, as Jankowski (1985) himself points out, usually no attempt is made to determine the number of zooids per lorica other than at the time of observation, so it is almost impossible to know whether species described in the literature as 'solitary' are in fact immature 'colonial' forms. Therefore, due to the paucity of data available, 'coloniality' (*sensu* Jankowski, 1985) is not recognised as a generic character in this revision, although it is employed for the separation of species.

At least two species of *Cothurnia* (*C. bavarica* and *C. variabilis*) form pseudocolonies; that is they develop as chains with each individual attached to the lorica of its neighbour via its external stalk. A third species, *C. nebaliae*, also forms pseudocolonies and, in addition, exhibits a dimorphic lorica structure with the individual in contact with the substratum ('basont' Jankowski, 1985) having a substantially longer external stalk than the others in the chain. Jankowski (1980) erected the genus *Dimorphocothurnia* for *Cothurnia nebaliae* on the basis of its lorica dimorphism.

Key to genera

- | | | |
|---|---|--------------------------|
| 1 | Aperture border rigid; no closure of aperture | 2 |
| | Aperture border pliable, used to close aperture on contraction of zooid(s) | <i>COTHURNIOPSIS</i> |
| 2 | Zooid(s) attached to inside of lorica either directly or via stalk | 3 |
| | Zooid(s) attached to inside of lorica via series of membranes | <i>CYCLODONTA</i> |
| 3 | Forms pseudocolonies; lorica dimorphism with individual in contact with substratum having longer external stalk than those of rest of chain | <i>DIMORPHOCOTHURNIA</i> |
| | Usually does not form pseudocolonies; not exhibiting lorica dimorphism | <i>COTHURNIA</i> |

Genus *COTHURNIA* Ehrenberg, 1831

Cothurniopsis sensu Penard, 1914

Cothurnopsis Entz, 1884

Semicothurnia Jankowski, 1976

Sincothurnia Jankowski, 1985

Tesnothea Jankowski, 1985

The name *Cothurnia* was first mentioned by Ehrenberg (in Hemprich & Ehrenberg, 1828) as part of an identification table in which loricate peritrichs with stalks (*Cothurnia*) were separated from those without stalks (*Vaginicola*). The original diagnosis of *Cothurnia* was founded on the description of *Cothurnia imberbis* Ehrenberg, 1831. A second species (*C. ? mystacina* Ehrenberg, 1831) was described at the same time but subsequently transferred to the genus *Acineta* (Ehrenberg, 1833). *C. imberbis* thus became the type species by monotypy. In his discussion of *Cothurnia*, Jankowski (1985) states that it is 'highly undesirable' for *C. imberbis* to be the type species because it is a 'very difficult' and 'in practice unstudied' organism; in its place he designated *C. maritima* Ehrenberg, 1838 as the type species. Jankowski was apparently unaware of Bacon's (1968) extensive study of *C. imberbis*, as a result of which more is known about this than any other species of *Cothurnia*. *C. imberbis* may therefore be properly designated as the type species of *Cothurnia*.

The taxonomy of *Cothurnia* remained largely unchanged over the next fifty years although several new species were added to the genus. In 1884 Entz erected the genus *Cothurnopsis* for cothurnid species with large, transversely folded external stalks and compact macronuclei. Kahl (1935) later submerged *Cothurnopsis* (which he misspelt '*Cothurniopsis*') into the genus *Cothurnia*, a decision supported by Matthes (1958) but opposed by Jankowski (1985).

In a recent review of the cothurnids, Jankowski (1985) divided the species of *Cothurnia* into those with two zooids per lorica, i.e. 'colonial' (*Sincothurnia*), and those with a single zooid per lorica (*Cothurnia sensu stricta*). A third genus, *Dimorphocothurnia* Jankowski, 1985, was erected for cothurnids which form pseudocolonies and possess dimorphic loricas. For the reasons stated in the previous section the concept of coloniality as a generic character has not been applied in this revision so *Sincothurnia* is synonymised in the genus *Cothurnia*.

Other genera erected by Jankowski for 'aberrant' *Cothurnia* species include *Baikalotheca* Jankowski, 1985, *Tesnothea* Jankowski, 1985, *Semicothurnia* Jankowski, 1976 and



Various junctions between stalk and lorica found in *Cothurnia* Fig. 11 External stalk only. Fig. 12 Endostyle and external stalk. Fig. 13 Mesostyle, endostyle and external stalk. Fig. 14 Endostyle and external stalk which penetrates the lorica wall via a special tube.

Daurotheca Jankowski, 1987. *Baikalotheca* does not possess a true external stalk and so falls outside the scope of this paper. The main distinguishing feature of *Tesnotheca* is its asymmetrical zooid, while that of *Semicothurnia* is its prominent and distinctive stalk; neither character is considered sufficient to separate the genera, so the species of *Tesnotheca* and *Semicothurnia* are transferred to *Cothurnia*.

Daurotheca is characterised by its unusual lorica shape and a tendency to form spines on the lorica wall. *Daurotheca* is of uncertain taxonomic status and is dealt with here under *Incertae Sedis*.

Diagnosis of *Cothurnia*

Marine, brackish or freshwater loricate peritrichs usually with one or two zooids per lorica. Lorica borne on stalk and attached to aquatic animals, plants or inanimate objects. Lorica without valves or other means of closing the aperture. Inner layer or septum sometimes present enclosing a space at posterior end of lorica; septum connected to base of lorica via mesostyle. Zooid(s) attached to base of lorica (or septum) directly or via endostyle.

Key to the species of *Cothurnia*

Although the number of zooids per lorica has been used in this key, this character should be applied only to fully developed individuals; a lorica with one zooid may be a partly developed 'colonial' (*sensu* Jankowski, 1985) species.

- 1 Endostyle and mesostyle absent 2
- Endostyle and/or mesostyle present 25
- 2 Marine 3
- Freshwater 10
- 3 Diameter of aperture \geq maximum lorica width 4
- Diameter of aperture $<$ maximum lorica width 6
- 4 Lorica with ridges or furrows 5
- Lorica without ridges or furrows *C. innata*
- 5 Lorica 35–40 μ m long with annular ridge near posterior end *C. amoyensis*
- Lorica 50–60 μ m long with two or more ridges and furrows on anterior half of lorica *C. antarctica*
- 6 External stalk without transverse folds or striae 7
- External stalk with transverse folds and striae *C. subglobosa*
- 7 Zooids reach as far as or just beyond aperture 8
- Zooids extend at least one third of their length beyond aperture 9
- 8 Lorica symmetrical with annular ridges; aperture border without clefts *C. curvula*
- Lorica asymmetrical and without ridges; lateral borders of aperture with distinct cleft(s) *C. inclinans*

- 9 Macronucleus lies transversely in body; zooid extends up to half its length beyond aperture *C. mobiusi*
- Macronucleus lies longitudinally in body; zooid extends up to one third of its length beyond aperture *C. ovalis*
- 10 External stalk penetrates lorica wall via special tube (Figs 11–14) 11
- External stalk does not penetrate lorica wall via special tube (Figs 11–14) 12
- 11 Lorica with annular ridge(s); two zooids per lorica *C. monoannulata*
- Lorica without annular ridge(s); one zooid per lorica *C. oviformis*
- 12 Diameter of aperture $>$ maximum lorica width 13
- Diameter of aperture \leq maximum lorica width 15
- 13 Lorica with two zooids 14
- Lorica with one zooid *C. spissa*
- 14 Forms pseudocolonies with several loricas attached in a chain; zooids extend just beyond aperture *C. bavarica*
- Not forming pseudocolonies; zooids extend up to half their length beyond aperture *C. patula*
- 15 Lorica with distinct annular ridges or furrows 16
- Lorica without annular ridges or furrows 17
- 16 Lorica cylindrical with evenly spaced furrows down entire length *C. lapponum*
- Lorica rotund with three distinct centrally located ridges *C. pupa*
- 17 Lorica with one zooid 18
- Lorica with two zooids *C. kahli*
- 18 Macronucleus long and vermiform 19
- Macronucleus short, compact and slightly curved or C-shaped 22
- 19 Diameter of aperture \geq greatest lorica width 20
- Diameter of aperture $<$ greatest lorica width *C. floscularia*
- 20 Macronucleus straight 21
- Macronucleus serpentine *C. soldida*
- 21 Lorica 75 μ m long \times 40 μ m wide; zooid extends up to one sixth of its length beyond aperture *C. macrodisca*
- Lorica 125 μ m long \times 75 μ m wide; zooid extends up to one third of its length beyond aperture *C. ovata*
- 22 Diameter of aperture $<$ greatest lorica width 23
- Diameter of aperture \geq greatest lorica width 24
- 23 Lorica curved; typically forms pseudocolonies with several loricas attached in a chain *C. variabilis*
- Lorica not curved; does not form pseudocolonies *C. vaga*
- 24 Peristomial lip thick and prominent; external stalk without transverse folds or striae *C. brevistyla*
- Peristomial lip not prominently thickened; external stalk with transverse striae *C. astaci*

25	Marine or brackish	26	Diameter of aperture > maximum lorica width; lorica without ridges or furrows	<i>C. complanata</i>
	Freshwater	73		
26	Mesostyle present	27	42	Lorica 150 μm long; CV lies in centre of zooid <i>C. elongata</i>
	Mesostyle absent	59		Lorica 50–62 μm long; CV lies just below peristome <i>C. parvula</i>
27	Endostyle present	28	43	Pellicular striations conspicuous 44
	Endostyle absent	52		Pellicular striations inconspicuous 47
28	Lorica with two zooids	29	44	Macronucleus straight 45
	Lorica with one zooid	34		Macronucleus serpentine 46
29	Aperture border without clefts	30	45	Zooid extends up to one third of its length beyond aperture; lorica without ridges and furrows <i>C. ceramicola</i>
	Aperture border with one or more clefts	33		Zooid extends up to one quarter of its length beyond aperture; lorica with ridges and furrows <i>C. coarctata</i>
30	Lorica without annular ridges	31	46	Brackish; lorica 95 μm long <i>C. obliqua</i>
	Lorica with annular ridges	<i>C. rhabdota</i>		Marine; lorica 50–60 μm long <i>C. simplex</i>
31	Lorica < 125 μm long; macronucleus straight	32	47	Zooid extends \geq one third of its length beyond aperture 48
	Lorica \geq 125 μm long; macronucleus coiled irregularly	<i>C. trophoniae</i>		Zooid extends < one third of its length beyond aperture 50
32	Zooids extend at least one third of their length beyond aperture; external stalk and mesostyle with conspicuous longitudinal striae	<i>C. apseudophila</i>	48	Lorica with ridges and furrows 49
	Zooids extend up to one quarter of their length beyond aperture; stalk and mesostyle with inconspicuous striae	<i>C. aplatita</i>		Lorica without ridges and furrows <i>C. stylarioides</i>
33	Aperture border with two clefts; longitudinal striae absent from mesostyle but present on endostyle	<i>C. felinska</i>	49	Lorica 121 μm long; length of external stalk one quarter lorica length <i>C. cyclopis</i>
	Aperture border with one cleft; longitudinal striae present on mesostyle but absent from endostyle	<i>C. cyathiforme</i>		Lorica 50–60 μm long; external stalk < one quarter lorica length <i>C. cypridicola</i>
34	Zooid extends as far as or just beyond aperture	35	50	External stalk with inconspicuous longitudinal striae 51
	Zooid extends at least one sixth of its length beyond aperture	43		External stalk with conspicuous longitudinal striae <i>C. harpacticici</i>
35	Macronucleus curved or twisted	36	51	Lorica 120 μm long; external stalk \geq one quarter lorica length <i>C. cordylophora</i>
	Macronucleus straight	37		Lorica 60–70 μm long; external stalk < one quarter lorica length <i>C. collaris</i>
36	Lorica 110–150 μm long; aperture border with clefts	<i>C. auriculata</i>	52	Lorica with two zooids 53
	Lorica 70 μm long; aperture border without clefts	<i>C. cytherideae</i>		Lorica with one zooid 54
37	External stalk with conspicuous longitudinal striae	38	53	Lorica curved; macronucleus short and C-shaped <i>C. limnoriae</i>
	External stalk with inconspicuous longitudinal striae	41		Lorica not curved; macronucleus vermiform and coiled irregularly <i>C. trophoniae</i>
38	Mesostyle and endostyle with conspicuous longitudinal striae	39	54	External stalk with conspicuous longitudinal striae 55
	Mesostyle and endostyle with inconspicuous longitudinal striae	<i>C. parvula</i>		External stalk with inconspicuous longitudinal striae 57
39	Lorica and external stalk not curved; aperture ovoid when viewed from above	40	55	Macronucleus straight 56
	Lorica and external stalk curved; aperture triangular when viewed from above	<i>C. triangula</i>		Macronucleus serpentine <i>C. butschlii</i>
40	Lorica 70 μm long; CV situated just below peristome	<i>C. halacaricola</i>	56	Lorica 81 μm long; pellicular striations inconspicuous <i>C. peloscolicis</i>
	Lorica 93–97 μm long; CV situated near proximal end of macronucleus	<i>C. nitocrae</i>		Lorica 53–55 μm long; pellicle clearly striated <i>C. gammari</i>
41	Diameter of aperture < maximum lorica width; lorica walls with irregular ridges and furrows	42	57	Aperture border without clefts 58
				Aperture border with cleft <i>C. incisa</i>
			58	Lorica 60 μm long; zooid with annular ridge(s) <i>C. fibripes</i>
				Lorica 125 μm long; zooid without annular ridge(s) <i>C. arcuata</i>
			59	Brackish 60
				Marine 63
			60	Diameter of aperture < maximum lorica width 61

Figs 15–17 *Cothurnia imberbis*; figs 15 & 16 after Bacon, 1965, bar = 50 μm ; fig. 17 after Ehrenberg, 1831.

Figs 18 & 19 *Cothurnia acuta*; fig. 18 after Precht, 1935, bar = 50 μm ; fig. 19 after Levander 1915.

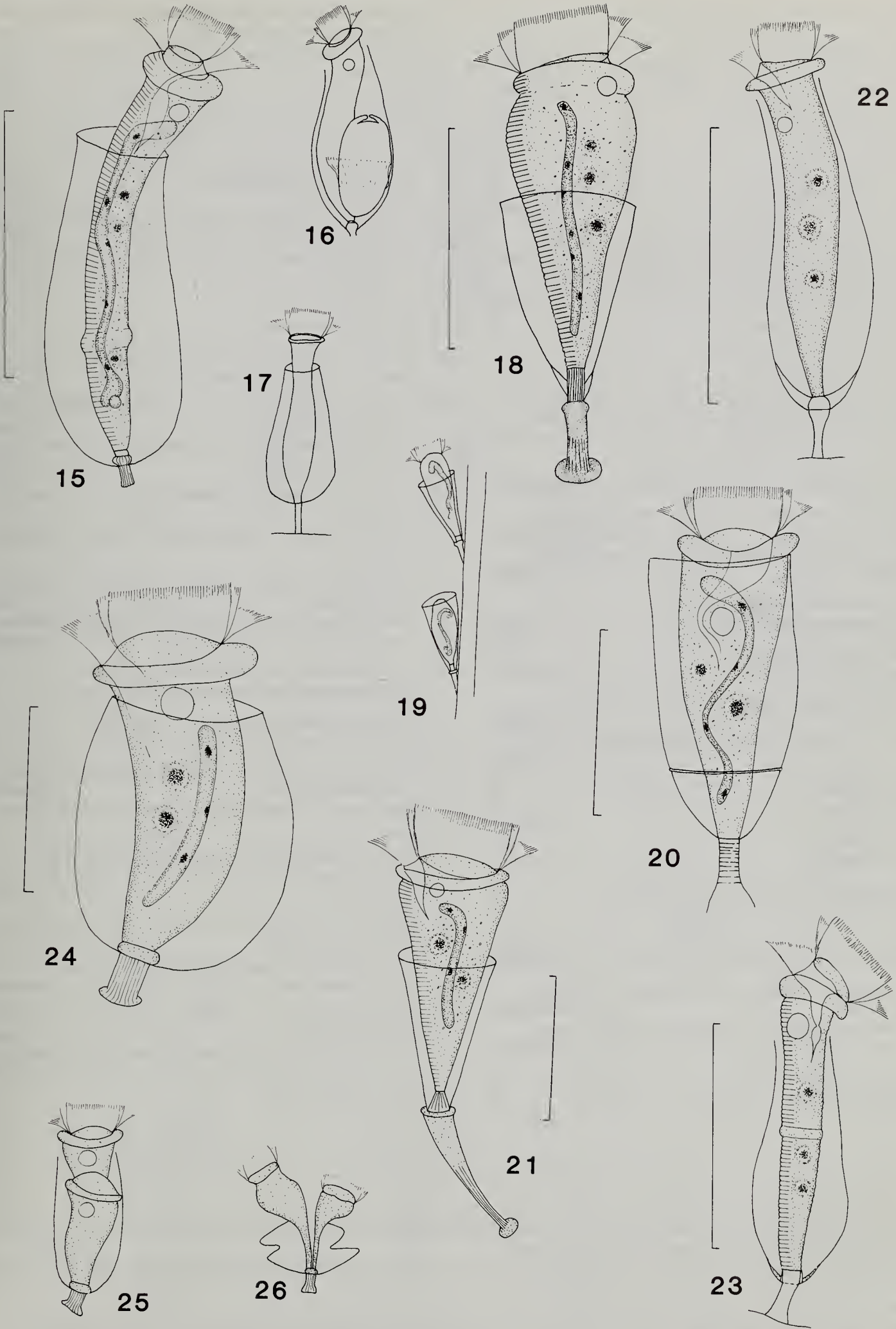
Fig. 20 *Cothurnia amoyensis*, after Wang, 1935, bar = 25 μm .

Fig. 21 *Cothurnia amphicteis*, after Lang, 1948, bar = 50 μm .

Fig. 22 *Cothurnia angusta*, after Kahl, 1935, bar = 50 μm .

Fig. 23 *Cothurnia annulata*, after Sommer, 1951, bar = 50 μm .

Figs 24–26 *Cothurnia anomala*, after Stiller, 1951; fig. 24 bar = 25 μm ; figs 25 & 26 variations in lorica shape.



Diameter of aperture \geq maximum lorica width	62	79	Lorica 113–132 μm long; aperture border extended to form two horn-like processes	<i>C. sieboldii</i>
61 Lorica curved, 100 μm long \times 50 μm wide	<i>C. recurvata</i>	Lorica 61 μm long; aperture border without horn-like processes	<i>C. cylindrica</i>	
Lorica not curved, 60 μm long \times 30 μm wide	<i>C. inflata</i>	80 Zooid extends $>$ one third of its length beyond aperture	81	
62 Lorica cylindrical, 110 μm long	<i>C. fecunda</i>	Zooid only reaches as far as or just beyond aperture	82	
Lorica conical, 50–56 μm long	<i>C. acuta</i>	81 Macronucleus long and vermiform	<i>C. ruthae</i>	
63 Lorica with two zooids	64	Macronucleus short and thick	<i>C. richtersi</i>	
Lorica with one zooid	66	82 Zooid with prominent annular ridge(s); pellicular striations conspicuous	<i>C. elegans</i>	
64 Aperture border with clefts	65	Zooid without annular ridge(s); pellicular striations inconspicuous	<i>C. angusta</i>	
Aperture border without clefts	<i>C. nodosa</i>	83 Lorica with two zooids	84	
65 Lorica 90–100 μm long; zooid 150 μm long and extends up to one third of its length beyond aperture	<i>C. sinuosa</i>	Lorica with one zooid	86	
Lorica 70–80 μm long; zooid 85–90 μm long and extends up to one fifth of its length beyond aperture	<i>C. entzi</i>	84 Diameter of aperture \leq maximum lorica width	85	
66 Pellicular striations conspicuous	67	Diameter of aperture $>$ maximum lorica width	<i>C. clausiens</i>	
Pellicular striations inconspicuous	70	85 Lorica 30–40 μm long; zooid only reaches as far as or just beyond aperture	<i>C. anomala</i>	
67 Lorica without ridges or furrows; zooid extends $>$ one quarter of its length beyond aperture	68	Lorica 71–82 μm long; zooid extends up to one third of its length beyond aperture	<i>C. oblonga</i>	
Lorica with ridges and furrows; zooid reaches just beyond aperture	<i>C. recurvata</i>	86 External stalk does not penetrate lorica wall via special tube	88	
68 Diameter of aperture \leq maximum lorica width	69	External stalk penetrates lorica wall via special tube (Figs 11–14)	87	
Diameter of aperture $>$ maximum lorica width	<i>C. amphicteis</i>	87 Zooid with annular ridge(s); pellicular striations conspicuous	<i>C. annulata</i>	
69 Lorica 40–45 μm long; peristomial lip prominently thickened	<i>C. membranoloricata</i>	Zooid without annular ridge(s); pellicular striations inconspicuous	<i>C. asymmetrica</i>	
Lorica 35 μm long; peristomial lip not prominently thickened	<i>C. maritima</i>	88 External stalk with transverse folds and ridges	89	
70 Lorica without annular ridges or furrows	71	External stalk without transverse folds and ridges	91	
Lorica with annular ridges and furrows	<i>C. cohni</i>	89 Diameter of aperture = maximum lorica width	90	
71 Aperture border without clefts	72	Diameter of aperture $<$ maximum lorica width	<i>C. curva</i>	
Aperture border with clefts	<i>C. compressa</i>	90 Macronucleus short and slightly curved; pellicular striations inconspicuous	<i>C. canthocampti</i>	
72 Lorica 100 μm long; length of external stalk \geq lorica	<i>C. longipes</i>	Macronucleus C-shaped; pellicular striations inconspicuous	<i>C. lata</i>	
Lorica 65–72 μm long; length of external stalk $<$ lorica	<i>C. subtilis</i>	91 Zooid reaches as far as or just beyond aperture	92	
73 Mesostyle present	74	Zooid extends $>$ one quarter of its length beyond aperture	94	
Mesostyle absent	83	92 Lorica 48–55 μm long; external stalk with inconspicuous longitudinal striae	93	
74 Endostyle present	75	Lorica 70–72 μm long; external stalk with conspicuous longitudinal striae	<i>C. carinogammari</i>	
Endostyle absent	78	93 External stalk 10–15 μm long; zooid with posterior annular ridge(s)	<i>C. irregularis</i>	
75 External stalk with transverse ridges or folds	76	External stalk 2 μm long; zooid without annular ridge(s)	<i>C. asimmetrica</i>	
External stalk without transverse ridges or folds	77	94 Lorica 125 μm long	95	
76 Lorica 80–100 μm ; macronucleus ovoid	<i>C. plectostlya</i>			
Lorica 60 μm ; macronucleus short and curved	<i>C. propinqua</i>			
77 Lorica cylindrical; diameter of aperture = maximum lorica width	<i>C. tekirghiolica</i>			
Lorica rounded posteriorly; diameter of lorica $<$ maximum lorica width	<i>C. imberbis</i>			
78 Lorica with two zooids	79			
Lorica with one zooid	80			

Figs 27 & 28 *Cothurnia antarctica*, after Daday, 1911, bar = 50 μm .

Figs 29 & 30 *Cothurnia aplatita*; fig. 29 after Felinska, 1965 (called *Cothurnia aplatita* var. *flexa*); fig. 30 after Stiller, 1939, bar = 50 μm .

Fig. 31 *Cothurnia apseudophila*, after Lang, 1948, bar = 100 μm .

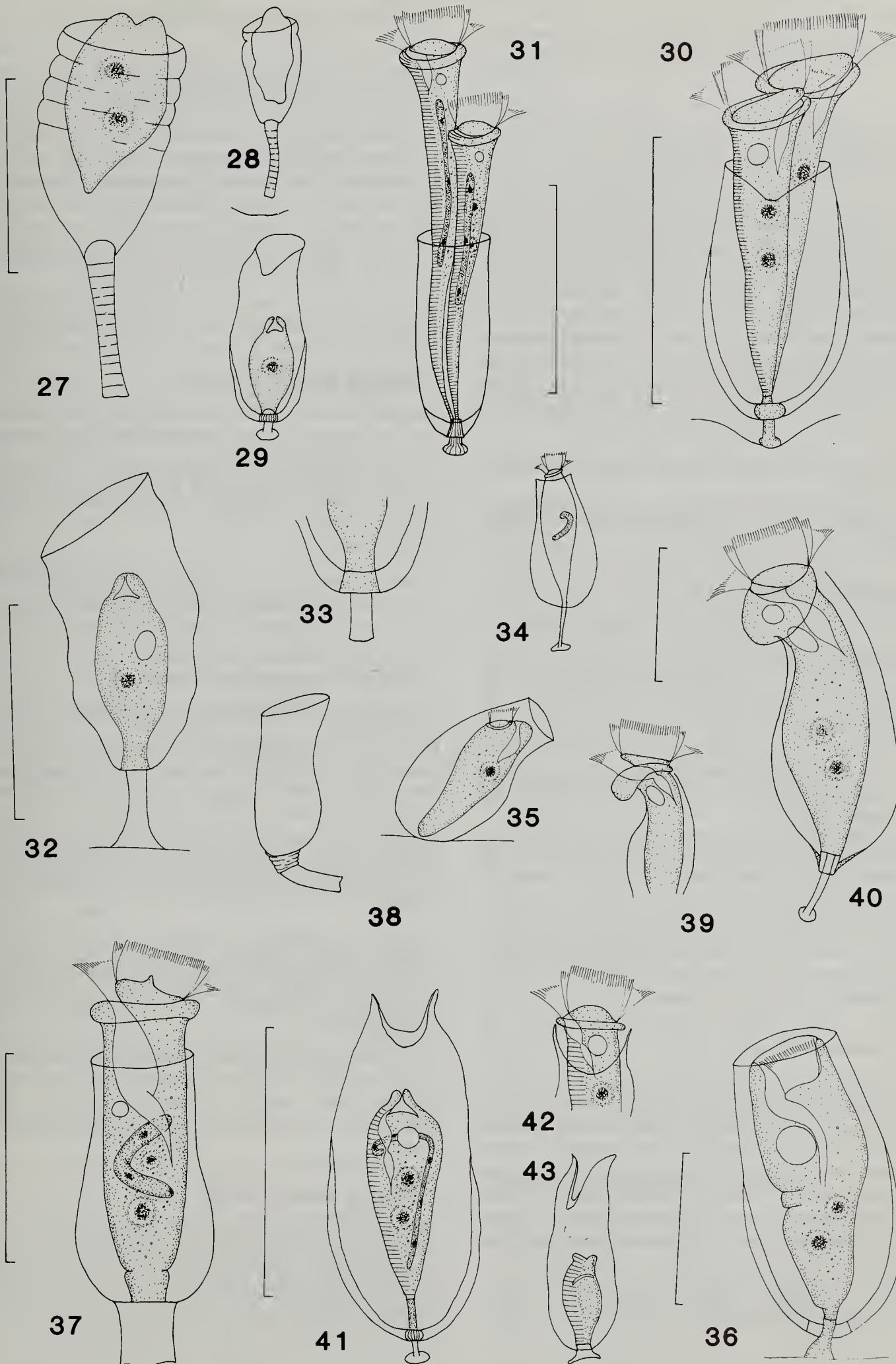
Figs 32–34 *Cothurnia arcuata*; figs 32 & 33 after Mereschkowsky, 1879, bar = 100 μm ; fig. 34 after Gourret and Roeser, 1886 (called *Cothurnia fusiformis*).

Figs 35 & 36 *Cothurnia asimmetrica*, after Banina and Polyakova, 1977, bar = 25 μm .

Figs 37 & 38 *Cothurnia astaci* after Matthes and Guhl, 1973; fig. 37 bar = 50 μm ; fig. 38 showing variation in lorica and external talk.

Figs 39 & 40 *Cothurnia asymmetrica*, after Sommer, 1951.

Figs 41–43 *Cothurnia auriculata*; figs 41 & 42 after Stiller, 1939; fig. 43 after Felinska, 1965, bar = 100 μm .



- Lorica 35–40 μm long *C. minutissima*
 95 Lorica 200 μm long; pellicular striations conspicuous
 *C. irregularis*
 Lorica 127 μm long; pellicular striations inconspicuous
 *C. plachteri*

Species descriptions

Cothurnia imberbis Ehrenberg, 1831

Semicothurnia imberbis (Ehrenberg, 1831) Jankowski, 1985

DESCRIPTION (Figs 15–17). Lorica 45–85 μm long \times 20–40 μm wide. Aperture 10–20 μm in diameter. External stalk 15 μm long, mesostyle short and broad, endostyle short and inconspicuous. External stalk and mesostyle with conspicuous longitudinal striae. Zooid 57–95 μm long \times 8–18 μm wide, extending about one fifth of its length beyond aperture. Annular ridge in region of telotroch band. Peristomial lip well developed, 13–18 μm in diameter. CV situated just below peristome. Macronucleus straight, curved anteriorly and lies longitudinally in zooid. Pellicle with fine striations.

HABITAT. Freshwater, attached to a variety of plant and animal substrates.

NOTE. This, the type species of the genus, was redescribed by Bacon (1968).

Cothurnia acuta Levander, 1915

Semicothurnia acuta (Levander, 1915) Jankowski, 1976

DESCRIPTION (Figs 18 & 19). Lorica conical, 50–56 μm long \times 30 μm wide. Aperture 31 μm in diameter. External stalk broad, up to 8 μm long; endostyle also broad, up to 4 μm long; mesostyle absent. Zooid 60 μm long \times 20 μm wide and extends up to one third of its length beyond aperture. Peristomial lip 18 μm in diameter. Macronucleus lies longitudinally in zooid, vermiform and curved anteriorly. Pellicular striations conspicuous.

HABITAT. Brackish water, originally isolated as an epizote of the polychaetes *Harmothoe sarsi* and *H. imbricata* (Levander, 1915).

NOTE. Jankowski (1976) erected the genus *Semicothurnia* for *C. acuta* on the basis of its broad external stalk. The stalk is not sufficiently distinctive to separate a new genus so this species is retained in the genus *Cothurnia*.

Cothurnia amoyensis Wang, 1935

DESCRIPTION (Fig. 20). Lorica 35–40 μm long \times 18–20 μm wide with annular ridge near posterior end; lorica cylindrical above the ridge and conical below. External stalk 6 μm long with transverse annulations. Mesostyle and endostyle absent. Zooid extends just beyond aperture, 45 μm long \times 15 μm wide. Peristomial lip well developed, 18 μm in diameter. Disc convex. CV situated one quarter of way down zooid. Macronucleus vermiform, curved at both ends and extends almost entire length of zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally found in a laboratory culture containing decomposing algae (Wang, 1935).

Cothurnia amphicteis Lang, 1948

Semicothurnia amphicteis (Lang, 1948) Jankowski, 1985

DESCRIPTION (Fig. 21). Lorica conical, 53–56 μm long \times 35 μm wide. Aperture 35–37 μm in diameter. External stalk 54–57 μm long, lower half with conspicuous longitudinal striae, upper half granular, and with ring-like thickening at point of attachment to lorica. Endostyle short, broad and with conspicuous longitudinal striae. Mesostyle absent. Zooid conical, 85 μm long \times 40 μm wide, and extends between one third and one half of its length beyond aperture. Peristomial lip well developed, 45 μm in diameter. Disc convex. CV lies just below peristome. Macronucleus elongate, slightly curved anteriorly. Pellicular striations conspicuous.

HABITAT. Marine, originally found attached to the setae of *Amphicteis gunneri* in coastal waters of Sweden (Lang, 1948).

Cothurnia angusta Kahl, 1933

DESCRIPTION (Fig. 22). Lorica elongate, 60 μm long \times 15–23 μm wide, rounded posteriorly. Aperture 10 μm in diameter. External stalk about 10 μm long, mesostyle short, endostyle absent. Zooid 70 μm long \times 12 μm wide and extends just beyond aperture. Peristome 18 μm diameter. CV situated about one sixth of way down zooid. Pellicular striations inconspicuous.

HABITAT. Brackish or freshwater, originally found attached to cyprid ostracods (Kahl, 1933; Precht, 1935); also found on *Enteromorpha intestinalis* (Sommer, 1951).

Cothurnia annulata Stokes, 1885

Cothurniopsis annulata (Stokes, 1885) Penard, 1922

DESCRIPTION (Fig. 23). Lorica 55 μm long \times 25 μm wide and rounded posteriorly. External stalk short; endostyle short and with conspicuous longitudinal striae; mesostyle absent. Zooid slender, 65 μm long \times 12 μm wide and with centrally located annular ridge. Peristomial lip 15 μm in diameter. CV situated about one sixth of way down zooid. Macronucleus straight and lies longitudinally in centre of zooid. Pellicular striations conspicuous.

HABITAT. Freshwater, originally isolated from North American ponds attached to *Myriophyllum* (Stokes, 1885, 1888); also found on the aquatic plants and algae *Lemna*, *Hydrodictyon reticulatum* and *Enteromorpha intestinalis* (Sommer, 1951).

NOTE. Although the name *C. annulata* was originally mentioned by Stokes in 1885, a detailed description and diagram did not appear until three years later (Stokes, 1888). *C. annulata* was redescribed by Penard (1922) and by Sommer (1951).

Cothurnia anomala Stiller, 1951

DESCRIPTION (Figs 24–26). Lorica 30–40 μm long \times 15–25 μm wide. Diameter of aperture equal to maximum lorica width. External stalk broad, 5 μm long; endostyle short and inconspicuous; mesostyle absent. Two zooids per lorica, one not reaching as far as aperture, the other extending just beyond

aperture. Peristomial lip well developed, 20 μm in diameter. CV situated just below peristome. Macronucleus slightly curved and lies longitudinally in zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally isolated from Lake Balaton as an epizoite of the amphipod *Corophium curvispinum* (Stiller, 1951).

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character among cothurnids, this species should be included in the genus *Sincothurnia*.

Cothurnia antarctica (Daday, 1911) n. comb.

Cothurniopsis antarctica Daday, 1911

DESCRIPTION (Figs 27 & 28). Lorica 50–60 μm long \times 30 μm wide with 1–4 annular constrictions on anterior half. Aperture 30 μm in diameter. External stalk 40–50 μm long and with transverse folds. Endostyle and mesostyle not observed. Zooid extends just beyond aperture. Macronucleus compact. Pellicular striations inconspicuous.

HABITAT. Marine, originally found in the Antarctic region as an epizoite of the ostracod *Philomedes laevipes* (Daday, 1911).

Cothurnia aplatita Stiller, 1939

Cothurnia aplatita var. *flexa* Felinska, 1965

DESCRIPTION (Figs 29 & 30). Lorica 45–65 μm long \times 25–30 μm wide and typically covered with particles of sand and detritus. External stalk and endostyle short; mesostyle short, broad and with conspicuous longitudinal striae. Two zooids per lorica, each 70–80 μm long \times 20–25 μm wide and extending up to one quarter of its length beyond aperture. Peristomial lip 25 μm in diameter. CV situated just below peristome. Macronucleus elongate. Pellicle with fine striations.

HABITAT. Marine, originally isolated from laboratory aquaria at Helgoland attached to Campanulariaceae (Stiller, 1939); also found in marine aquaria at Plymouth attached to green algae (Felinska, 1965).

NOTE. According to Felinska (1965) *C. aplatita* and *C. aplatita* var. *flexa* are identical apart from minor differences in the shape of the lorica. These differences are considered to be insufficient for the recognition of the two organisms as separate taxa. Furthermore, if coloniality (*sensu* Jankowski, 1985) is accepted as a generic character among cothurnids, this species should be included in the genus *Sincothurnia*.

Cothurnia apseudophila Lang, 1948

Sincothurnia apseudophila (Lang, 1948) Jankowski, 1985

DESCRIPTION (Fig. 31). Lorica cylindrical, 88–92 μm long \times 29–31 μm wide, and rounded posteriorly. Aperture 29–31 μm in diameter. External stalk and mesostyle 7–8 μm long with conspicuous longitudinal striae; endostyle 1.5 μm long. Two zooids per loria one of which is always larger than the other; larger zooid 164 μm long \times 20 μm wide, extending up to one half of its length beyond aperture; smaller zooid 128 μm long \times 17 μm wide, extending up to one third of its length beyond aperture. Peristome 25–30 μm in diameter. CV situated just

below peristome. Macronucleus straight and lies longitudinally in zooid. Pellicular striations conspicuous.

HABITAT. Marine, originally found on the setae of *Apseudes spinosus* in Swedish coastal waters (Lang, 1948).

Cothurnia arcuata Mereschkowsky, 1879

Cothurnia arenata (Mereschkowsky, 1879) Zelinka, 1928

Cothurnia fusiformis (Gourret & Roeser, 1886) Zelinka, 1928

DESCRIPTION (Figs 32–34). Lorica 125 μm long \times 60–65 μm wide, cylindrical and curved. External stalk up to 40 μm long, broad and with large basal disc. Mesostyle short and broad. Endostyle absent. Zooid 125 μm long \times 35 μm wide and just reaches aperture. Peristomial lip 25 μm in diameter. CV situated near centre of zooid. Macronucleus C-shaped and lies in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally isolated from the White Sea (Mereschkowsky, 1879); also isolated from the Port of Marseille (Gourret & Roeser, 1886).

Cothurnia asimmetrica Banina and Polyakova, 1977

DESCRIPTION (Figs 35 & 36). Lorica 48–52 μm long \times 25 μm wide and typically inclined at an angle to substrate. Aperture 12–18 μm in diameter. External stalk 2 μm long and penetrates lorica wall via special tube; endostyle 1 μm long; mesostyle absent. Zooid 50 μm long \times 17 μm wide and just reaches aperture. CV situated one third of way down zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found on *Cladophora* (Banina and Polyakova, 1977).

Cothurnia astaci Stein, 1854

Cothurniopsis astaci (Stein, 1854) Entz, 1884

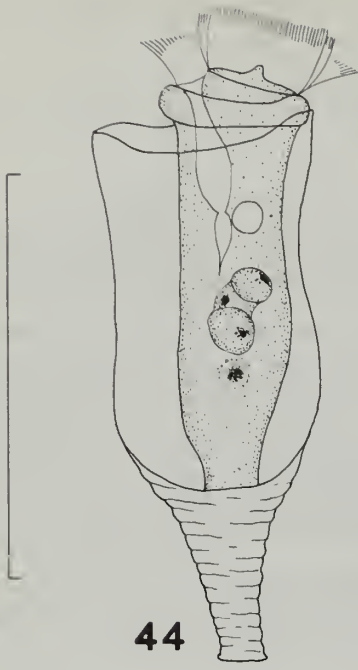
DESCRIPTION (Figs 37 & 38). Lorica 65–90 μm long \times 35–45 μm wide and rounded posteriorly. Aperture 40 μm in diameter. External stalk 15 μm long, slightly curved and with transverse folds. Mesostyle and endostyle absent. Zooid slender, 75 μm long \times 20 μm wide and extends just beyond aperture. CV lies one third of way down zooid. Macronucleus short, C-shaped and situated in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, found on a variety of substrates including the crayfish *Astacus fluviatilis* and *A. leptodactylus* (Matthes and Guhl, 1973), and on *Entomostraca* (Kahl, 1935).

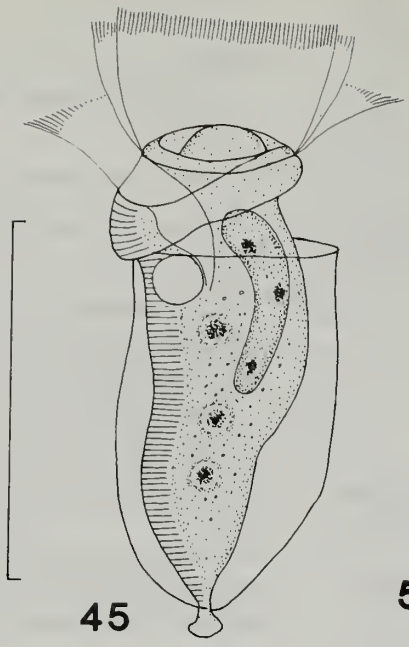
NOTE. A recent redescription of this species was given by Matthes and Guhl (1973).

Cothurnia asymmetrica Sommer, 1951

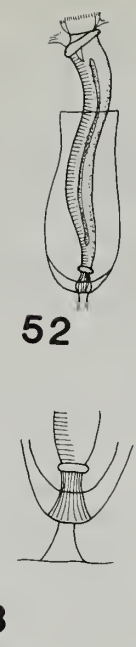
DESCRIPTION (Figs 39 & 40). Lorica 50 μm long \times 25 μm wide and with prominent bulge about two thirds of way down. Aperture 12 μm in diameter. Neck region below aperture curved. External stalk slender, about 10 μm long; endostyle short; mesostyle absent. Zooid 50 μm long \times 15 μm wide and extends just beyond aperture. Peristomial lip 18 μm in diameter and prominently thickened. CV large, ovoid and lies below peristome. Pellicular striations inconspicuous.



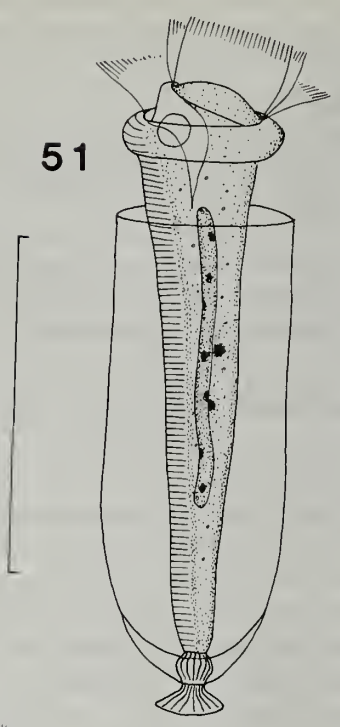
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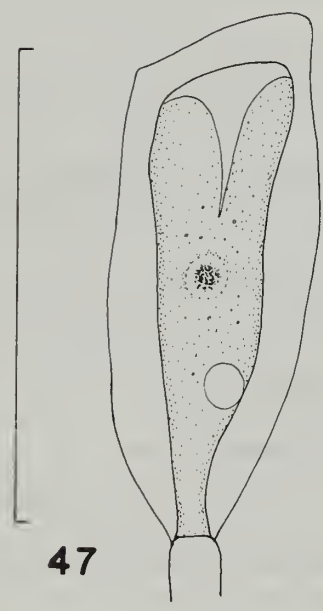
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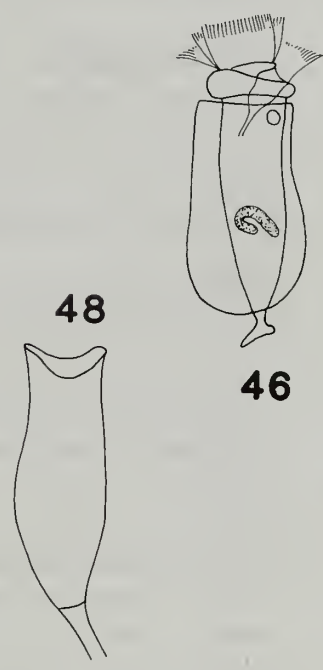
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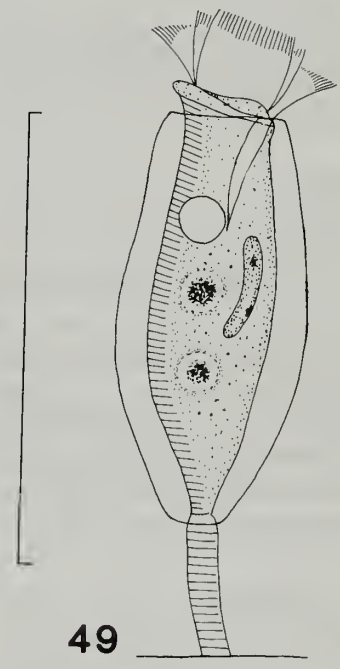


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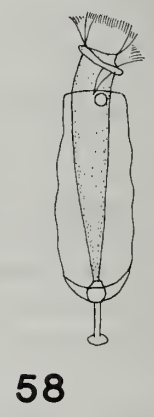


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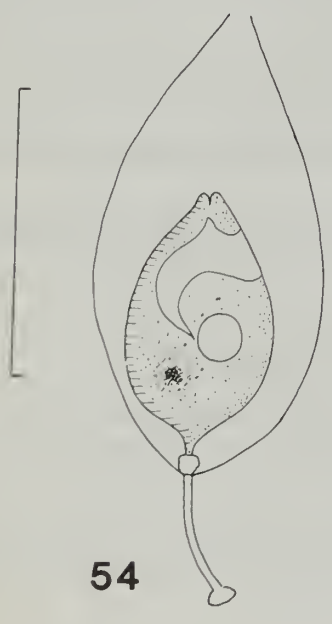
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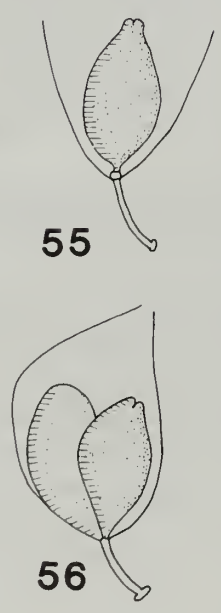
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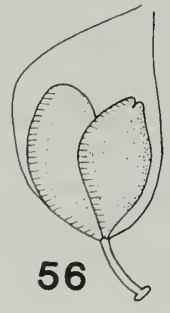
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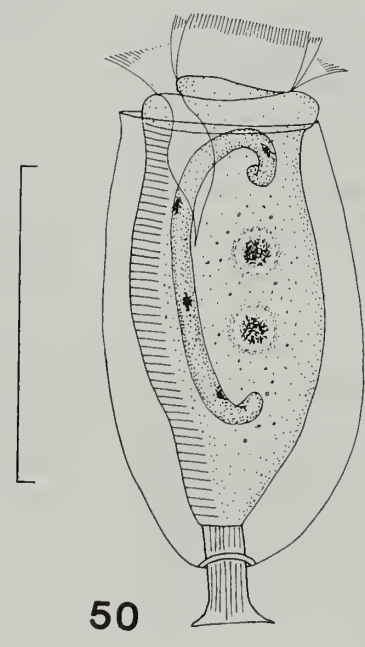
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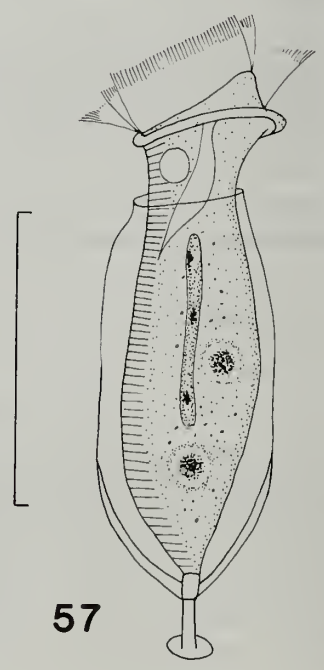
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HABITAT. Freshwater, originally found attached to *Cladophora* and *Enteromorpha intestinalis* (Sommer, 1951).

***Cothurnia auriculata* Stiller, 1939**

Cothurnia auriculata var. *flexa* Felinska, 1965

Sincothurnia auriculata (Stiller, 1939) Jankowski, 1985

Sincothurnia flexa (Felinska, 1965) Jankowski, 1985

DESCRIPTION (Fig. 41–43). Lorica irregular, 110–150 μm long \times 45–60 μm wide. Aperture narrow with two clefts in aperture border. External stalk short and with broad basal disc; mesostyle short, broad and with conspicuous longitudinal striae; endostyle slender and variable in length. Zooid cylindrical in shape, 20 μm wide and just reaches aperture. Peristomial lip 25 μm in diameter. Disc convex. CV lies just below peristome. Macronucleus vermiform with anterior end curved horizontally across peristome. Pellicle with fine striations.

HABITAT. Marine, originally isolated from the North Sea attached to *Cladophora* (Stiller, 1939); also reported from marine aquaria at Plymouth (Felinska, 1965).

***Cothurnia bavarica* Matthes and Guhl, 1973**

DESCRIPTION (Fig. 44). Lorica 85–93 μm long \times 49–59 μm wide. Aperture 60 μm in diameter. External stalk 33–35 μm long \times 10–12 μm wide and with transverse folds. Mesostyle and endostyle absent. Forms pseudocolonies with loricas of several individuals attached to each other via external stalks to form a chain. Two zooids per lorica, each 87–118 μm long \times 20–35 μm wide and extends just beyond aperture. Peristomial lip well developed, 35 μm in diameter. Disc raised and umbilicate. CV situated near mid-region of infundibulum which reaches centre of body. Macronucleus thick, horseshoe-shaped and lies in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to the crayfish *Astacus leptodactylus* and *Cambarus affinis* (Matthes and Guhl, 1973).

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

***Cothurnia brevistyla* Nenninger, 1948**

DESCRIPTION (Figs 45 & 46). Lorica cylindrical 43.5–54.9 μm long \times 20–25 μm wide, and rounded posteriorly. External stalk short and with broad basal disc. Endostyle and mesostyle absent. Zooid 58 μm long \times 20 μm wide. Peristomial lip well developed, 25 μm in diameter. Disc convex. CV lies just

below peristome. Macronucleus thick, slightly curved and lies longitudinally in zooid. Pellicle with fine striations.

HABITAT. Freshwater, originally found attached to algae from canal water in Germany (Nenninger, 1948).

***Cothurnia butschlii* Zelinka, 1913**

DESCRIPTION (Figs 47 & 48). Lorica 53.2 μm long \times 27 μm wide and tapers towards stalk. Aperture 25 μm in diameter. External stalk 10 μm long \times 4 μm wide; endostyle short; mesostyle absent. External stalk and endostyle with continuous longitudinal striae. Zooid 25–30 μm long when contracted. Macronucleus C-shaped and lies longitudinally in zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally found attached to echinodera (Zelinka, 1913).

NOTE. The data above is based on observations of contracted specimens only. Uncontracted specimens of *C. butschlii* have yet to be described.

***Cothurnia canthocampti* Stokes, 1886**

Cothurniopsis canthocampti Monard, 1919

DESCRIPTION (Fig. 49). Lorica 84–95 μm \times 40–42 μm wide. Aperture 25 μm in diameter. External stalk 20–30 μm long and with regular transverse folds; endostyle short and inconspicuous; mesostyle absent. Zooid 85 μm long \times 30 μm wide extending just beyond aperture. CV situated one third of way down zooid. Macronucleus short, curved and lies longitudinally in centre of body. Pellicular striations conspicuous.

HABITAT. Freshwater, originally found on *Canthocamptus minutus* in North America (Stokes, 1886).

***Cothurnia carinogammari* Stiller, 1953**

DESCRIPTION (Fig. 50). Lorica 70–72 μm \times 40–42 μm wide. Aperture 25–30 μm diameter. External stalk 10 μm long; endostyle short and broad; mesostyle absent. Zooid 75 μm long \times 25 μm wide and reaches just beyond aperture. Peristomial lip 25 μm in diameter. Macronucleus elongate, C-shaped and lies longitudinally in zooid. Pellicle with fine transverse striations.

HABITAT. Freshwater, originally found attached to the crustacean *Gammarus* (Stiller, 1953).

***Cothurnia ceramicola* Kahl, 1933**

DESCRIPTION (Figs 51–53). Lorica 65–77 μm long \times 30 μm wide and rounded posteriorly. Aperture 25 μm in diameter.

Fig. 44 *Cothurnia bavarica*, after Matthes and Guhl, 1973, bar = 100 μm .

Figs 45 & 46 *Cothurnia brevistyla*, after Nenninger, 1948, bar = 50 μm .

Figs 47 & 48 *Cothurnia butschlii*, after Zelinka, 1928, bar = 50 μm .

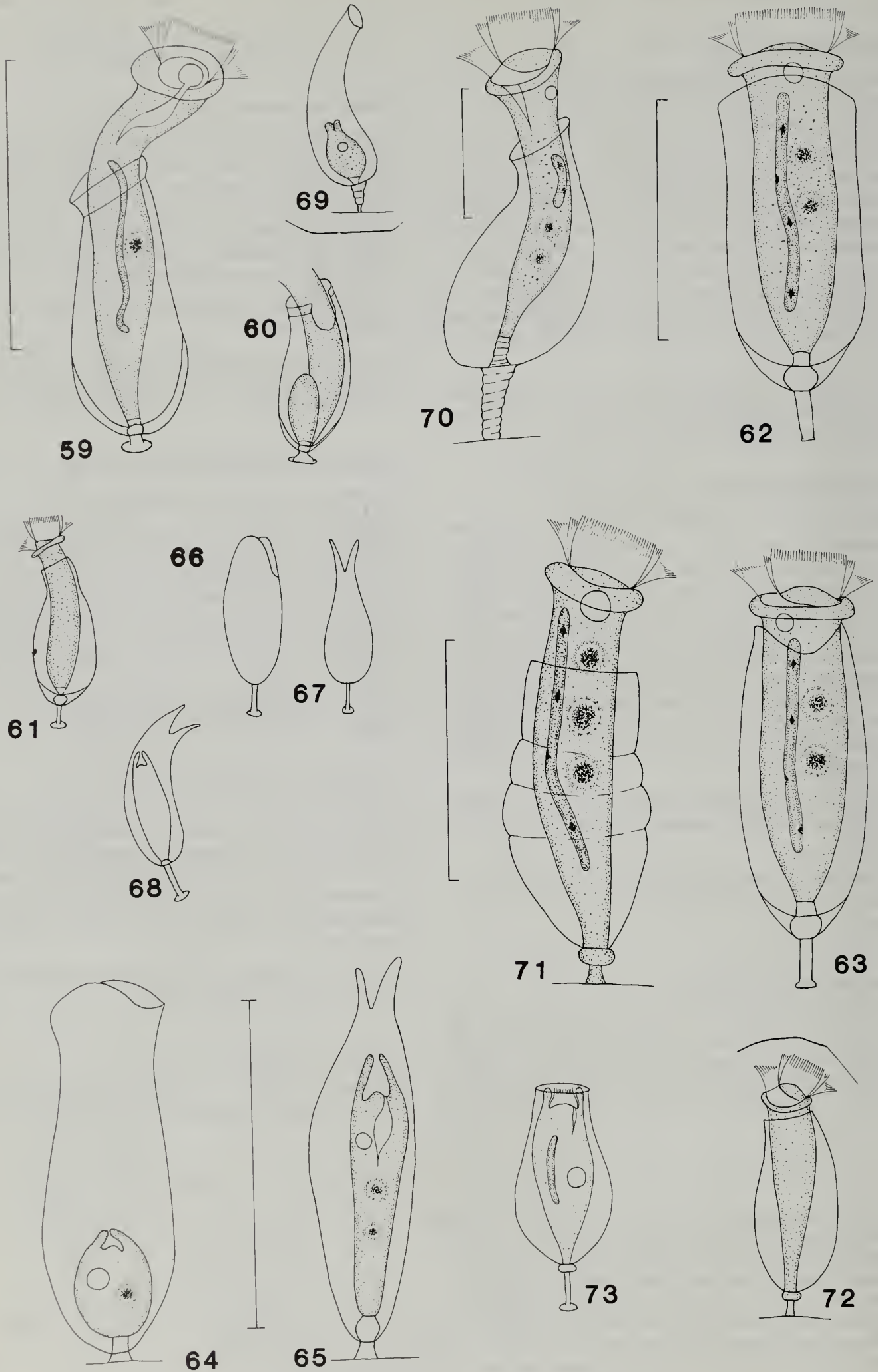
Fig. 49 *Cothurnia canthocampti*, after Stokes, 1886, bar = 100 μm .

Fig. 50 *Cothurnia carinogammari*, after Stiller, 1953, bar = 50 μm .

Figs 51–53 *Cothurnia ceramicola*; fig. 51 after Precht, 1935, bar = 50 μm ; figs 52 & 53 after Kahl, 1933.

Figs 54–56 *Cothurnia clausiensis*, after Stiller, 1951, bar = 25 μm .

Figs 57 & 58 *Cothurnia coarctata*; fig. 57 after Felinska, 1965, bar = 50 μm ; fig. 58 after Kahl, 1935.



External stalk and endostyle short; mesostyle short, broad and with conspicuous longitudinal striae. Two zooids may be present per lorica, each 80 μm long \times 15 μm wide and extending up to one third of its length beyond aperture. Peristomial lip 20 μm in diameter. Disc convex. Macronucleus vermiform, extending almost entire length of zooid. Pellicular striations conspicuous.

HABITAT. Marine, originally found as an epibiont of the alga *Ceramium* (Kahl, 1933). Also found attached to the bryozoa *Crisia eburnea* and *Cribilina punctata*, the polychaete *Spirorbis spirorbis* and the cnidarian *Laomedea loveni* (Precht, 1935), and by Felinska (1965) attached to algae collected at sea and from laboratory aquaria at Plymouth.

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

Cothurnia clausiens Stiller, 1951

DESCRIPTION (Figs 54–56). Lorica asymmetrical, 35–50 μm long \times 20–35 μm wide. External stalk about one third lorica length, slender and curved; endostyle short; mesostyle absent. Two zooids may be present per lorica, each 25–35 μm long when contracted. CV lies near centre of zooid. Macronucleus vermiform and situated longitudinally in body. Pellicle with fine striations.

HABITAT. Freshwater, originally found attached to arthropods from Lake Balaton (Stiller, 1951).

NOTE. Stiller (1951) stated that the CV is filled by a second CV nearby. This second CV is most probably a canal in which water collects before passing into the CV. Furthermore, if coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

Cothurnia coarctata Kahl, 1933

DESCRIPTION (Figs 57 & 58). Lorica 66–75 μm long \times 30 μm wide with transverse ridges and furrows. Aperture 20–25 μm in diameter. External stalk slender, 15–20 μm long; mesostyle and endostyle both short. Zooid 85 μm long \times 25 μm wide, extending about one quarter of its length beyond aperture. Peristomial lip 30 μm in diameter. Disc flat and obliquely raised. Macronucleus straight and lies longitudinally in body. Pellicular striations conspicuous.

HABITAT. Marine, originally found attached to debris from marine aquaria at Kiel (Kahl, 1933).

NOTE. *C. coarctata* was redescribed by Felinska (1965) from specimens found on green algae at Plymouth.

Cothurnia cohni (Cohn, 1866) Kent, 1881

Cothurnia pupa Cohn, 1866

DESCRIPTION (Fig. 74). Lorica 60 μm long \times 20 μm wide and pale red in colour. Upper two thirds of lorica conical, lower third rounded with several conspicuous annular ridges and furrows. External stalk broad, 15 μm long; endostyle 50 μm long and with transverse striae; mesostyle absent. Zooid 50 μm long extending just beyond aperture, slender and with an equatorial swelling. Peristomial lip well developed, 15–20 μm in diameter.

HABITAT. Marine.

NOTE. *C. pupa* Cohn, 1866 was renamed *C. cohni* by Kent (1881) in order to solve the problem of homonymy with *C. pupa* Eichwald, 1849.

Cothurnia collaris Kahl, 1933

C. collaris var. *incisa* Felinska 1965

DESCRIPTION (Figs 59–61). Lorica rotund, 60–100 μm long \times 30–45 μm wide. Aperture 15 μm wide and inclined at an angle oblique to the main lorica axis. Neck short and curved. Aperture border occasionally with cleft. External stalk short and slender; mesostyle short and broad with conspicuous longitudinal striae; endostyle short. Zooid cylindrical, 70–150 μm long \times 15–25 μm wide, extending up to one third of its length beyond aperture. Diameter of peristomial lip slightly greater than maximum body width. Macronucleus elongate and lies longitudinally in centre of body. Pellicular striations inconspicuous.

HABITAT. Marine or brackish, originally found attached to algae from laboratory tanks at Kiel (Kahl, 1933).

NOTE. *C. collaris* was redescribed by Stiller (1939) and Felinska (1965).

Cothurnia complanata Precht, 1935

DESCRIPTION (Figs 62 & 63). Lorica 78–81 μm long \times 32–35 μm wide. External stalk slender, 12–15 μm long; mesostyle short and broad; endostyle short and inconspicuous. Zooid 80 μm long \times 24 μm wide and extends just beyond aperture. Peristomial lip 30 μm in diameter. CV lies just beneath peristome. Macronucleus straight and lies longitudinally in zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally found as an epibiont of the polychaete *Stylarioides plumosus* (Precht, 1935).

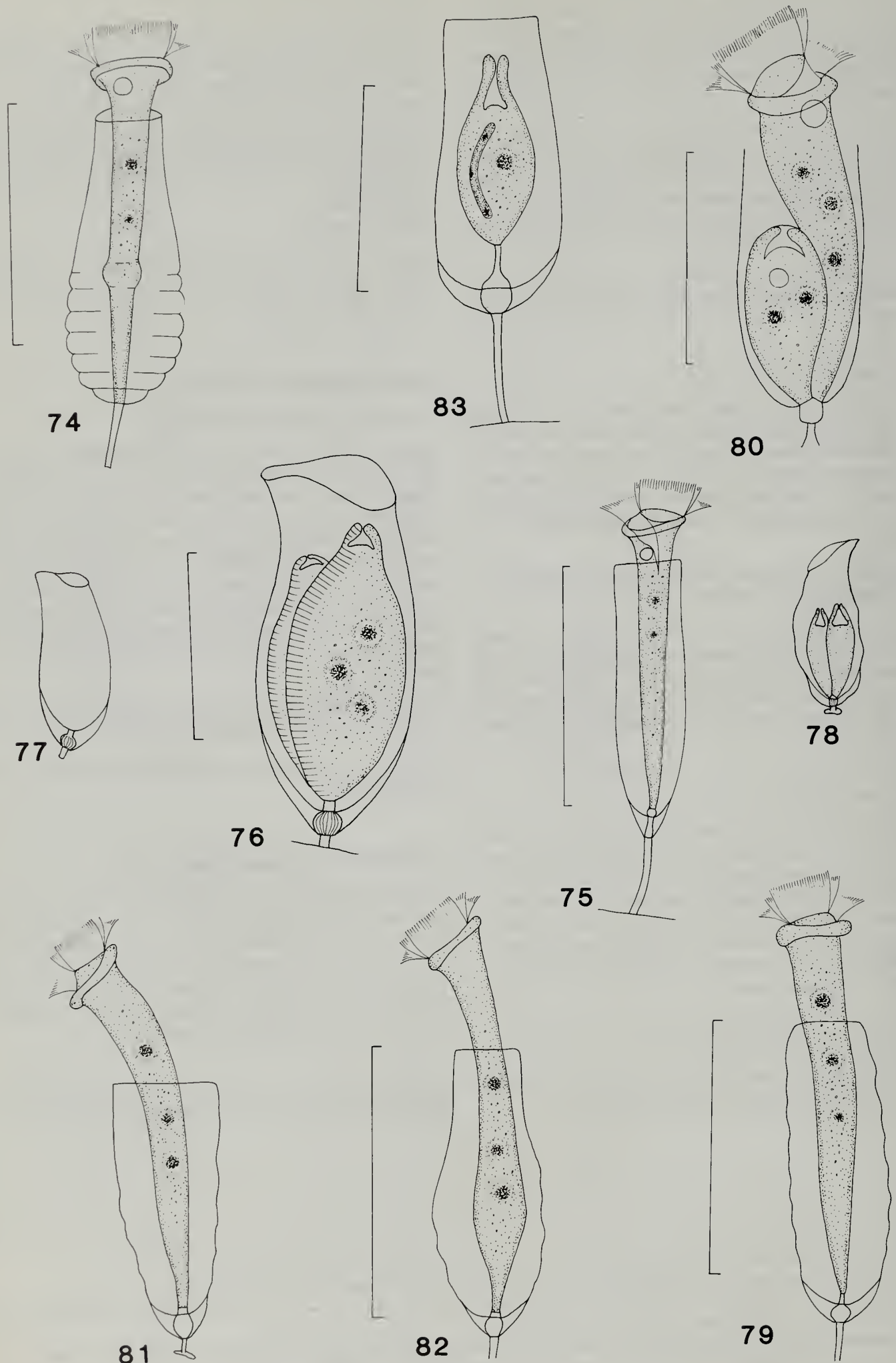
Figs 59–61 *Cothurnia collaris*, bar = 100 μm ; figs 59 & 60 composite after Felinska, 1965; fig. 61 after Kahl, 1935.

Figs 62 & 63 *Cothurnia complanata*, after Precht, 1935, bar = 100 μm ; fig. 62 ventral view; fig. 63 lateral view.

Figs 64–68 *Cothurnia compressa*; figs 64 & 65 after Claparede and Lachmann, 1858, bar = 100 μm ; figs 66 & 67 after Kahl, 1935 (called *Cothurnia compressula*); fig. 68 after Kahl, 1935 (called *Cothurnia flexa*).

Figs 69 & 70 *Cothurnia curva*; fig. 69 composite after Kent, 1881 (called *Cothurnia gracilis*); fig. 70 after Stein, 1867, bar = 50 μm .

Figs 71–73 *Cothurnia curvula*; figs 71 & 72 after Entz, 1884, bar = 50 μm ; fig. 73 after Stiller, 1971.



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Cothurnia compressa Claparede and Lachmann, 1858*Cothurnia compressa* var. *flexa* Wailes, 1928*Cothurnia compressula* (Wailes, 1928) Kahl, 1933*Cothurnia flexa* Kahl, 1935*Sincothurnia compressa* (Claparede and Lachmann, 1858) Jankowski, 1985*Sincothurnia compressula* (Wailes, 1928) Jankowski, 1985

DESCRIPTION (Figs 64–68). Lorica 100–140 μm long \times 50 μm wide. Aperture elliptical when viewed from above, 45 μm \times 15 μm . Aperture border with two deep clefts. External stalk short, endostyle short and broad, mesostyle absent. Contracted zooid 110 μm long \times 30 μm wide. CV situated one quarter of way down zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally found attached to bryozoa and algae (Claparede and Lachmann, 1858).

NOTE. Stiller (1939) and Felinska (1965) described cothurnids which they identified as *C. compressa*, although both of these organisms differ from Claparede and Lachmann's (1858) *C. compressa* in that they possess a mesostyle. *C. compressa* Stiller, 1939 appears to be synonymous with *C. auriculata*, while *C. compressa* Felinska, 1965 closely resembles *C. ceramicola*.

Cothurnia cordylophorae Kahl, 1933

DESCRIPTION (Fig. 75). Lorica cylindrical, 120 μm long \times 35 μm wide. Aperture 35 μm in diameter. External stalk 40 μm long; mesostyle short and broad; endostyle short and inconspicuous. Zooid elongate, 160 μm long \times 15 μm wide and extends one sixth of its length beyond aperture. Pellicular striations inconspicuous.

HABITAT. Brackish water, originally found as an epizoite of the cnidarian *Cordylophora* sp. (Kahl, 1933); also found by Precht (1935) on *Cordylophora caspia*.

Cothurnia curva Stein, 1867*Cothurnia gracilis* Kent, 1881.

DESCRIPTION (Figs 69 & 70). Lorica curved, 70–100 μm long \times 35–40 μm wide, colourless when young becoming red when mature. Aperture 15–20 μm in diameter. Neck region just below aperture narrow and curved. External stalk broad; endostyle slender; mesostyle absent. Endostyle and external stalk with transverse striae. Zooid 90 μm long \times 15 μm wide and extends up to one third of its length beyond aperture. Macronucleus short and lies longitudinally in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to *Entomostraca* (Stein, 1867); also occurs as an epizoite of the

crayfish *Astacus leptodactylus* and *Cambarus affinis* (Krucinska and Simon, 1968).

Cothurnia curvula Entz (1876), 1884*Cothurnia imberbis* var. *curvula* Entz, 1876

DESCRIPTION (Figs 71–73). Lorica 60 μm long \times 30 μm wide, occasionally with three centrally located annular furrows. Aperture 15 μm in diameter. External stalk short with bulbous thickening at its point of attachment to lorica. Mesostyle and endostyle absent. Zooid 60 μm long \times 8–10 μm wide and extends just beyond aperture. Macronucleus straight and lies longitudinally in zooid. Pellicular striations inconspicuous.

HABITAT. Marine, found attached to harpacticoid copepods from the Gulf of Neapel (Entz, 1884).

Cothurnia cyathiforme Stiller, 1939*Cothurnia compressa* var. *cyathiformis* Felinska, 1965*Sincothurnia cyathiformis* (Stiller, 1939) Jankowski, 1985

DESCRIPTION (Figs 76–78). Lorica asymmetrical, 95–100 μm long \times 45 μm wide. Aperture 30 μm wide and with shallow cleft in border. External stalk and endostyle short; mesostyle broad with conspicuous longitudinal striae. Two zooids per lorica, each 70 μm long when contracted. Pellicular striations conspicuous.

HABITAT. Marine.

NOTE. The data above are based on observations of contracted specimens only. Uncontracted specimens of *C. cyathiforme* have yet to be described.

Cothurnia cyclopis Kahl, 1933

DESCRIPTION (Fig. 79). Lorica 60 μm long \times 25 μm wide with irregular ridges and furrows. External stalk slender 15 μm long; mesostyle short and broad; endostyle short and slender. Zooid 80 μm long \times 20 μm wide, extending up to one third of its length beyond aperture. Pellicular striations inconspicuous.

HABITAT. Marine, originally found attached to harpacticoid copepods (Kahl, 1933).

Cothurnia cylindrica Sommer, 1951

DESCRIPTION (Fig. 80). Lorica cylindrical, 61 μm long \times 29 μm wide. Aperture 27 μm in diameter. External stalk 5 μm long with a broad cylindrical swelling at its point of attachment to lorica. Two zooids per lorica, each 81–95 μm long \times 13–16 μm wide and extending up to one fifth of its length beyond

Fig. 74 *Cothurnia cohni*, after Kahl, 1935, bar = 50 μm .

Fig. 75 *Cothurnia cordylophorae*, after Kahl, 1935, bar = 100 μm .

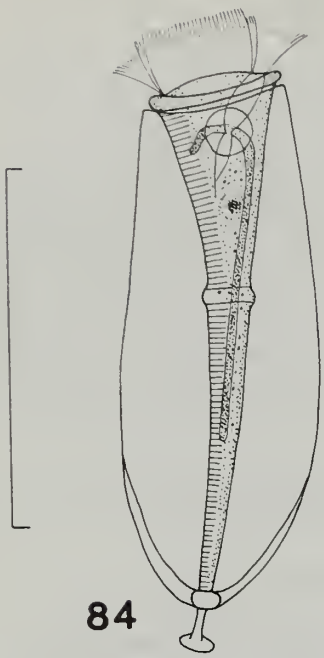
Figs 76–78 *Cothurnia cyathiforme*; figs 76 & 77 after Stiller, 1939, bar = 50 μm ; fig. 78 after Felinska, 1965 (called *Cothurnia compressa* var. *cyathiformis*).

Fig. 79 *Cothurnia cyclopis*, after Kahl, 1933, bar = 50 μm .

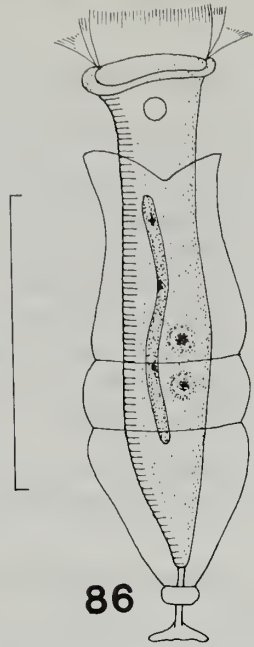
Fig. 80 *Cothurnia cylindrica*, after Sommer, 1951, bar = 50 μm .

Figs 81 & 82 *Cothurnia cypridicola*, after Kahl, 1933, bar = 50 μm .

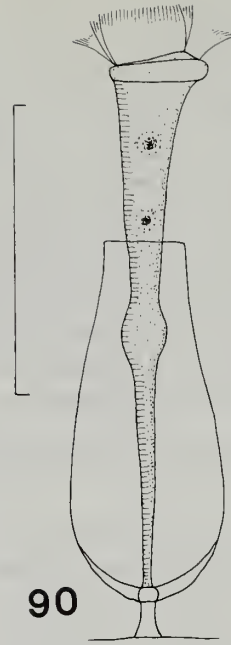
Fig. 83 *Cothurnia cytherideae*, after Kahl, 1933, bar = 50 μm .



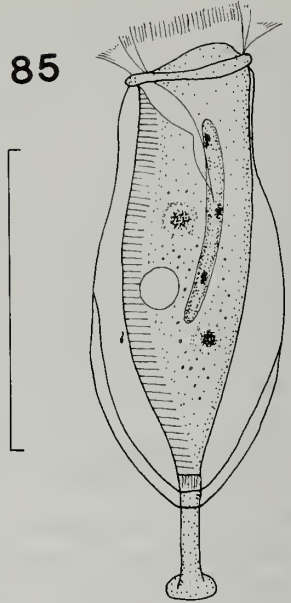
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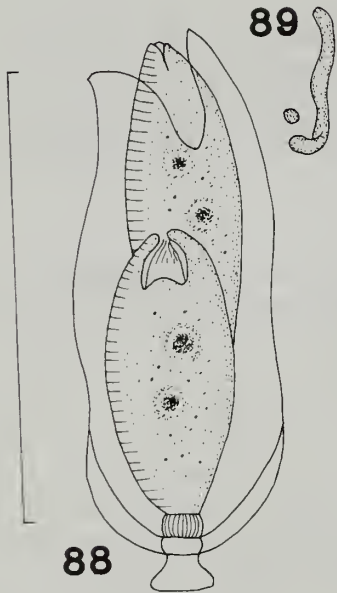
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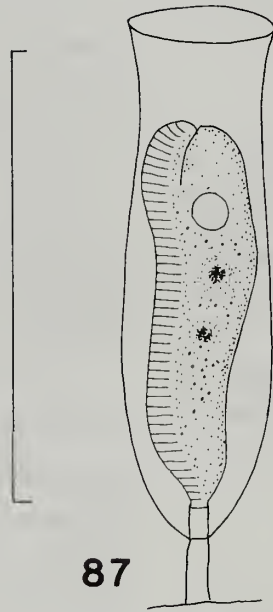
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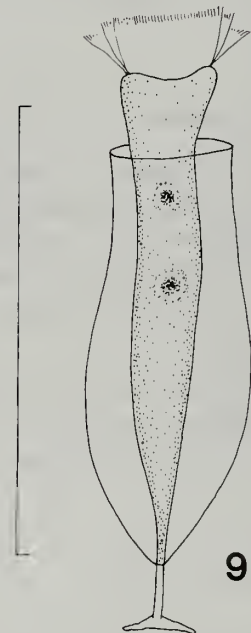
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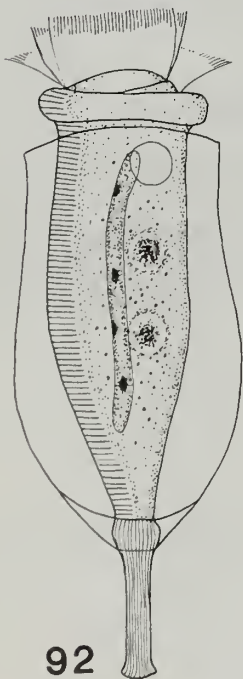
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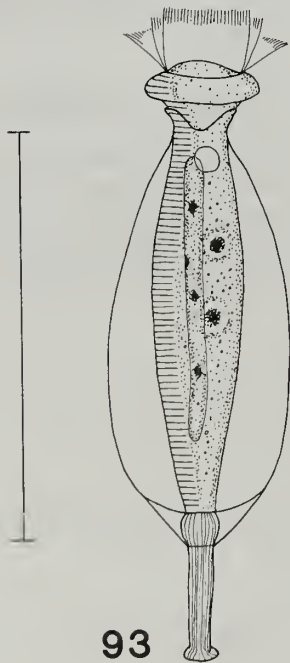
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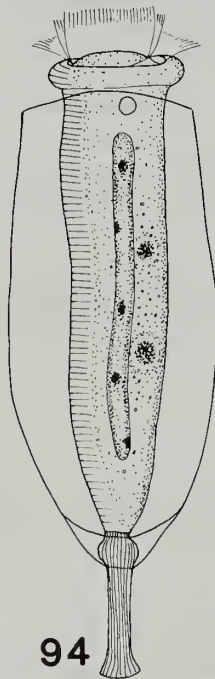
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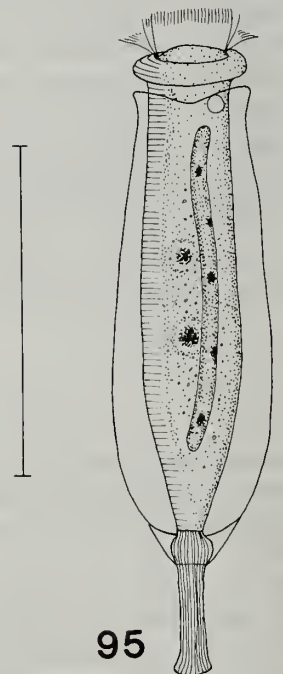
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aperture. Peristomial lip 20–22 μm in diameter. Disc obliquely elevated. CV situated just below peristome. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to *Enteromorpha intestinalis* (Sommer, 1951).

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

***Cothurnia cypridicola* Kahl, 1933**

DESCRIPTION (Figs 81 & 82). Lorica 50–60 μm long \times 20–25 μm wide and with irregular ridges and furrows. Aperture ovoid when viewed from above, 25 μm \times 15 μm . External stalk short; mesostyle and endostyle short and broad. Zooid elongate, 70–80 μm long \times 10–12 μm wide and extending up to one third of its length beyond aperture. Pellicular striations inconspicuous.

HABITAT. Marine or brackish water, originally found on cyprids (Kahl, 1933); also found on the gastropods *Hydrobia ulvae* and *H. jenkinsi*, and on the ostracod *Cyprideis littoralis* (Precht, 1935).

***Cothurnia cytherideae* Kahl, 1933**

DESCRIPTION (Fig. 83). Lorica cylindrical, 70 μm long \times 35 μm wide and rounded posteriorly. Aperture 30 μm in diameter. External stalk slender 35 μm long; mesostyle broad; endostyle slender. Zooid ovoid when contracted, 45 μm long \times 20 μm wide. Macronucleus curved and lies longitudinally in zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally found as an epibiont of the hydroid *Cytheridea* (Kahl, 1933).

***Cothurnia elegans* Stiller, 1940**

DESCRIPTION (Fig. 84). Lorica 65–75 μm long \times 30 μm wide. Aperture 20 μm in diameter. External stalk 6–10 μm long; mesostyle short and broad; endostyle absent. Zooid 65–75 μm long \times 10–30 μm wide with centrally located annular ridge. Zooid just reaches aperture when extended. Peristome 30 μm in diameter. CV large and situated just below peristome. Macronucleus curved anteriorly and lies longitudinally in the body. Pellicular striations conspicuous.

HABITAT. Marine or freshwater, originally found attached to algae from Lake Holstein (Stiller, 1940); also isolated from laboratory aquaria at Plymouth attached to green algae (Felinska, 1965).

***Cothurnia elongata* Felinska, 1965**

Sincothurnia elongata (Felinska, 1965) Jankowski, 1985

DESCRIPTION (Fig. 85). Lorica 150 μm long \times 65 μm wide. Aperture 40–45 μm wide. External stalk 30–40 μm long; mesostyle short; endostyle short with conspicuous longitudinal striae. Zooid 150 μm long \times 45 μm wide and just reaches aperture when extended. Peristomial lip 45 μm in diameter. CV lies near the centre of body. Macronucleus straight and lies longitudinally in anterior part of zooid. Pellicular striations conspicuous.

HABITAT. Marine, originally isolated from laboratory aquaria at Plymouth (Felinska, 1965).

***Cothurnia entzi* Kahl, 1933**

Cothurnia nodosa Entz, 1884

DESCRIPTION (Fig. 86). Lorica 70–80 μm long \times 30–40 μm wide and with two or three centrally located annular furrows. Aperture border with shallow cleft. External stalk slender, up to 50 μm long and with bulbous swelling at point of attachment to lorica; endostyle short and slender; mesostyle absent. Two zooids per lorica, each 85–90 μm long \times 20 μm wide and extending up to one quarter of its length beyond aperture. Peristomial lip well developed, 25 μm in diameter. CV situated near centre of infundibulum. Macronucleus straight or slightly curved and lies longitudinally in zooid. Pellicular striations conspicuous with convex ribbing between striations.

HABITAT. Marine.

***Cothurnia fecunda* Stokes, 1893**

DESCRIPTION (Fig. 87). Lorica cylindrical, 110 μm long \times 35 μm wide. Aperture 30 μm in diameter. External stalk 15 μm long; endostyle inconspicuous; mesostyle absent. Two zooids per lorica, each 80 μm long \times 20 μm wide when contracted, although only one zooid may contract completely at any time. Pellicular striations conspicuous.

HABITAT. Brackish water, originally found attached to filamentous algae in North American canal water (Stokes, 1893).

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*. Uncontracted specimens of *C. fecunda* have yet to be described.

***Cothurnia felinska* (Felinska, 1965) n. sp.**

Cothurnia compressa var. *compressula* Felinska, 1965

DESCRIPTION (Figs 88 & 89). Lorica 110 μm long \times 40 μm

Fig. 84 *Cothurnia elegans*, after Stiller, 1940, bar = 50 μm .

Fig. 85 *Cothurnia elongata*, after Felinska, 1965, bar = 100 μm .

Fig. 86 *Cothurnia entzi*, after Entz, 1884, bar = 50 μm (called *Cothurnia nodosa*).

Fig. 87 *Cothurnia fecunda*, after Stokes, 1893, bar = 100 μm .

Figs 88 & 89 *Cothurnia felinska*, after Felinska, 1965 (called *Cothurnia compressa* var. *compressula*); fig. 88 bar = 100 μm ; fig. 89 nuclei.

Fig. 90 *Cothurnia fibripes*, after Kahl, 1933, bar = 50 μm .

Fig. 91 *Cothurnia floscularia*, after Perty, 1852, bar = 100 μm .

Figs 92 & 93 *Cothurnia gammari*, after Precht, 1935, bar = 50 μm ; fig. 92 ventral view; fig. 93 lateral view.

Figs 94 & 95 *Cothurnia halacaricola*, after Precht, 1935, bar = 50 μm ; fig. 94 ventral view; fig. 95 lateral view.

wide with irregular ridges and furrows. Aperture 25 μm wide with two deep clefts in border. External stalk short and broad; mesostyle short; endostyle short and broad with conspicuous longitudinal striae. Two zooids per lorica, each 60–100 μm long \times 20–25 μm wide when contracted. Macronucleus lies longitudinally in zooid with posterior end curved upwards. Pellicular striations conspicuous.

HABITAT. Marine, originally found attached to algae from marine aquaria at Plymouth (Felinska, 1965).

NOTE. Felinska (1965) called this organism *Cothurnia compressa* var. *compressula* because it possesses features common to both *C. compressa* Claparede and Lachmann, 1858 and *C. compressula* Kahl, 1935. However it also differs from both of these taxa in terms of its nuclear shape, mesostyle and the longitudinal striae on the endostyle. This last feature, along with the shape of the aperture, serves to separate *C. felinska* from another similar species, *C. cyathiforme* Stiller, 1939.

Cothurnia fibripes Kahl, 1933

DESCRIPTION (Fig. 90). Lorica 60 μm long \times 30 μm wide, rounded posteriorly and with irregular ridges and furrows. Aperture 15 μm in diameter. External stalk short and broad; mesostyle broad and with conspicuous longitudinal striae; endostyle absent. Zooid elongate, 90 μm long \times 10 μm wide, extending up to one third of its length beyond aperture, and with a centrally located annular ridge. Peristome 15–20 μm in diameter. Pellicle with fine striations.

HABITAT. Marine, originally isolated from laboratory aquaria at Kiel (Kahl, 1933).

Cothurnia floscularia Perty, 1852

DESCRIPTION (Fig. 91). Lorica 85 μm long \times 40 μm wide. Aperture 30 μm in diameter. External stalk slender, 8 μm long; mesostyle and endostyle absent. Zooid 90 μm long \times 20 μm wide, extending just beyond aperture. Pellicular striations inconspicuous.

HABITAT. Freshwater.

Cothurnia gammari Precht, 1935

Sincothurnia gammari (Precht, 1935) Jankowski, 1985

DESCRIPTION (Figs 92 & 93). Lorica compressed dorso-ventrally, 53–55 μm long \times 25–34 μm wide, occasionally with irregular ridges and furrows. Aperture ovoid when viewed from above, 25 μm \times 10 μm . External stalk 10–20 μm long; mesostyle short and broad; endostyle absent. Mesostyle and

external stalk with conspicuous longitudinal striae. Zooid 65 μm long \times 13–22 μm wide, reaching just beyond aperture when extended. Peristomial lip well developed, 15–20 μm in diameter. Disc obliquely elevated. Macronucleus situated longitudinally in zooid, usually curved at both ends. Pellicular striations conspicuous.

HABITAT. Marine, originally found attached to *Gammarus locusta* (Precht, 1935); also found attached to *G. oceanicus* and *G. duebeni* (Fenchel, 1965).

Cothurnia halacaricola Precht, 1935

DESCRIPTION (Figs 94 & 95). Lorica 70 μm long \times 23–35 μm wide. Aperture ovoid 28 μm \times 17 μm . External stalk 15 μm long; mesostyle short and broad; endostyle inconspicuous. All three stalks with conspicuous longitudinal striae. Zooid cylindrical, 70 μm long \times 15 μm wide and reaches just beyond aperture. Peristomial lip well developed, 20 μm in diameter. CV situated just below peristome. Macronucleus straight and lies longitudinally in body. Pellicular striations conspicuous.

HABITAT. Marine, originally found as an epibiont of the halacarid *Copidognathus fabriciusi* (Precht, 1935).

Cothurnia harpactici Kahl, 1933

DESCRIPTION (Figs 96 & 97). Lorica cylindrical, 75–88 μm long \times 28–35 μm wide, occasionally with three or four annular ridges and furrows. Aperture 30 μm in diameter. External stalk 15 μm long and sometimes curved; mesostyle short and broad; endostyle short. All three stalks with conspicuous longitudinal striae. Zooid 105 μm long \times 17–20 μm wide, extending up to one fifth of its length beyond aperture. Peristomial lip 20 μm in diameter. Macronucleus lies longitudinally in body, proximal end slightly curved. Pellicular striations conspicuous.

HABITAT. Marine, originally found as an epizoite of harpacticoid copepods (Kahl, 1933); also found by Precht (1935) on the harpacticoids *Cletocamptus confluens* and *Mesochra lillgeborgi*.

Cothurnia inclinans Felinska, 1965

DESCRIPTION (Fig. 98). Lorica compressed dorso-ventrally, 57 μm long \times 40 μm and with irregular ridges and furrows. Aperture 25 μm wide with a deep cleft in each lateral border. External stalk long and slender with a distinct swelling at point of attachment to lorica; mesostyle and endostyle absent. Zooid 65 μm long \times 25 μm wide, extending up to one third of its length beyond aperture. Peristome 40 μm in diameter.

Figs 96 & 97 *Cothurnia harpactici*, after Precht, 1935, bar = 100 μm ; fig. 96 ventral view; fig. 97 lateral view.

Fig. 98 *Cothurnia inclinans*, after Felinska, 1965, bar = 50 μm .

Fig. 99 *Cothurnia inflata*, after Stokes, 1893, bar = 50 μm .

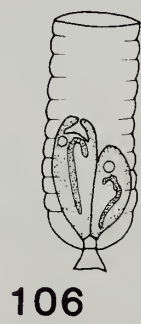
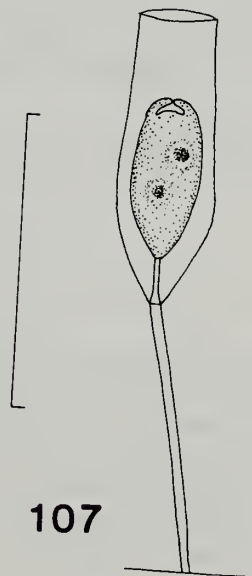
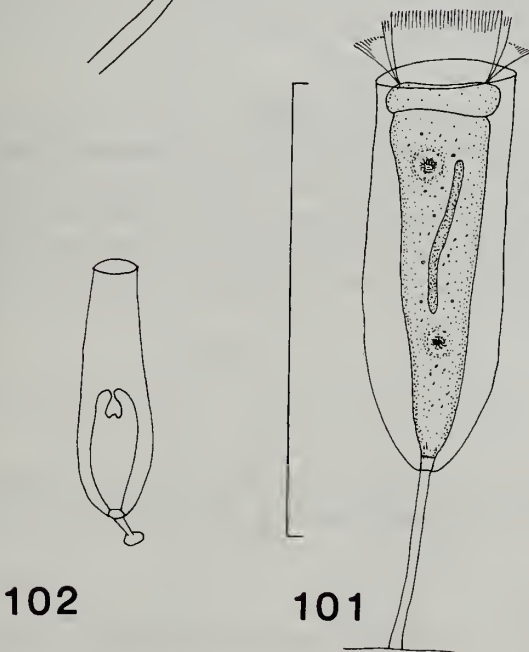
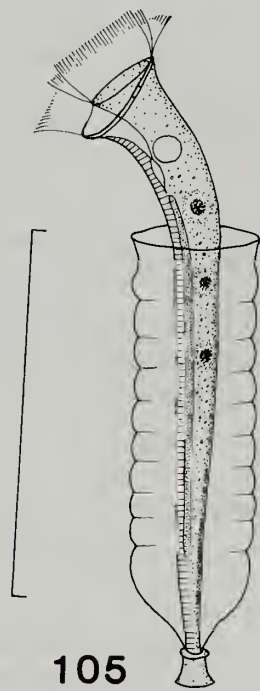
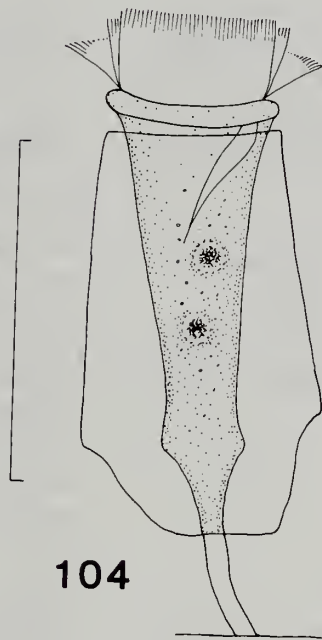
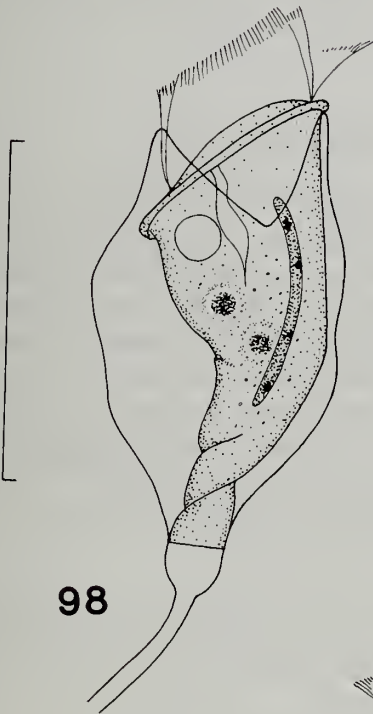
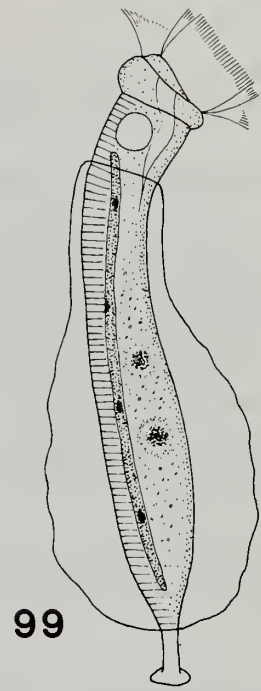
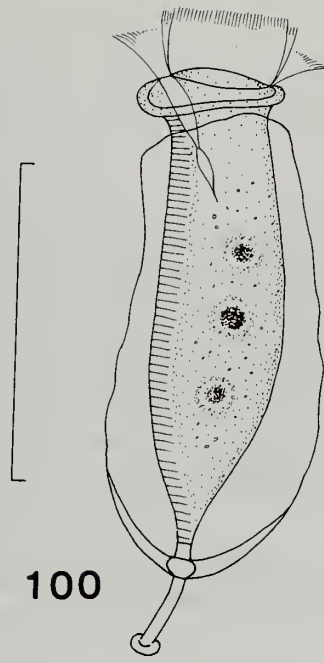
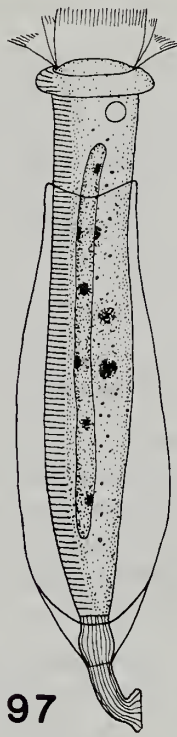
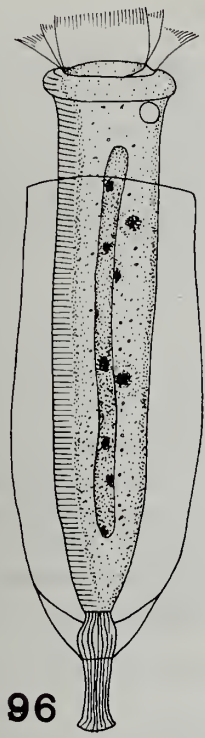
Fig. 100 *Cothurnia infecta*, after Stiller, 1939, bar = 50 μm .

Figs 101–103 *Cothurnia innata*; fig. 101 after Müller, 1786, bar = 50 μm ; figs 102 & 103, after Hofker, 1930.

Fig. 104 *Cothurnia irregularis*, after Fromentel, 1874, bar = 50 μm .

Figs 105 & 106 *Cothurnia lapponum*; fig. 105 after Penard, 1922, bar = 100 μm ; fig. 106 after Wang, 1977 (called *Cothurnia lapponum naidongensis*).

Fig. 107 *Cothurnia longipes*, after Mereschkowsky, 1879, bar = 100 μm .



Disc convex. CV situated just below peristome. Macronucleus straight and lies in upper two thirds of zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally found attached to algae from marine aquaria at Plymouth (Felinska, 1965).

***Cothurnia inflata* Stokes, 1893**

DESCRIPTION (Fig. 99). Lorica 60 μm long \times 30 μm wide, rounded posteriorly and with irregular ridges and furrows. External stalk short and slender; endostyle short and with conspicuous longitudinal striae; mesostyle absent. Zooid 75 μm long \times 12 μm wide, extending up to one fifth of its length beyond aperture. Peristomial lip 15 μm in diameter. Disc obliquely elevated. CV situated just below peristome. Macronucleus straight, extending almost entire zooid length. Pellicle with fine striations.

HABITAT. Brackish water, originally found attached to filamentous algae from Coney Island, New York (Stokes, 1893).

***Cothurnia inflecta* Stiller, 1939**

DESCRIPTION (Fig. 100). Lorica 70 μm long \times 35 μm wide with irregular ridges and furrows. Aperture 25 μm in diameter. External stalk slender, 10 μm long; mesostyle short and broad; endostyle short and slender. Zooid 70 μm long \times 20 μm wide and reaches just beyond aperture. Peristomial lip 25 μm in diameter. Macronucleus vermiform. Pellicular striations conspicuous.

HABITAT. Marine, originally found attached to green algae from the North Sea near Helgoland (Stiller, 1939).

NOTE. The original diagram of this species was labelled '*Cothurnia inflexa*' (Stiller, 1939); this is assumed to be a misspelling of *C. inflecta*.

***Cothurnia innata* Müller, 1786**

Cothurnia hofkeri (Hofker, 1930) Kahl, 1933

DESCRIPTION (Figs 101–103). Lorica cylindrical, 40–100 μm long \times 20–27 μm wide. Aperture 10–15 μm in diameter. External stalk 20 μm long; endostyle short and broad; mesostyle absent. Two zooids per lorica, each 40–50 μm long \times 10–15 μm wide and not reaching as far as aperture. Peristomial lip well developed, 15 μm in diameter. Pellicular striations inconspicuous.

HABITAT. Marine, found by Hofker (1930) attached to *Hydrobia* spp.

***Cothurnia irregularis* Kent, 1881**

Cothurnia nodosa Fromentel, 1874

DESCRIPTION (Fig. 104). Lorica 55 μm long \times 35 μm wide, anterior end conical, posterior end broad and rounded. Aperture 20 μm in diameter. External stalk 10–15 μm long; endostyle short and inconspicuous; mesostyle absent. Zooid 55 μm long \times 15 μm wide and extending just beyond aperture. Peristome 20 μm in diameter. Pellicular striations inconspicuous.

HABITAT. Freshwater.

***Cothurnia kahli* Banina and Polyakova, 1977**

DESCRIPTION (Fig. 108). Lorica 43–50 μm long \times 21–29 μm wide. Aperture 18 μm in diameter. External stalk 3–4 μm long and penetrates lorica wall via special tube. Two zooids per lorica, each 50–56 μm long \times 15 μm wide and extends just beyond aperture. Peristome 18 μm in diameter. CV lies just below peristome. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to *Cladophora* (Banina and Polyakova, 1977).

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

***Cothurnia lapponum* Penard, 1922**

Cothurnia lapponum naidongensis Wang Jiaji, 1977

DESCRIPTION (Figs 105 & 106). Lorica cylindrical 92–116 μm long \times 30–49 μm wide and with regular annular furrows along the entire length with exception of posterior end. External stalk 7–8 μm long; mesostyle and endostyle absent. Two zooids per lorica, each 140 μm long \times 15 μm wide and extends one quarter of its length beyond aperture. Peristome 25 μm in diameter. CV situated near centre of infundibulum. Macronucleus straight and lies longitudinally in zooid. Micro-nucleus large, ovoid and lies below posterior end of macronucleus. Pellicle with fine striations.

HABITAT. Freshwater, originally found on *Sphagnum* from Haparanda, Sweden (Penard, 1922); also isolated from marsh water at Naidong, Tibet, 400 m above sea level (Wang Jiaji, 1977).

NOTE. *C. lapponum naidongensis* was described by Wang Jiaji (1977) as a subspecies of *C. lapponum*. Wang Jiaji cited the shape of the lorica as the main difference between the two taxa. However, no description of an uncontracted *C. lapponum naidongensis* was given and no mention was made of the endostyle, which is absent in Penard's animal but appears to

Fig. 108 *Cothurnia kahli*, after Banina and Polyakova, 1977, bar = 50 μm .

Figs 109–111 *Cothurnia lata*, after Kellicott, 1883, bar = 50 μm ; fig. 109 ventral view; fig. 110 aperture, anterior view; fig. 111 lateral view.

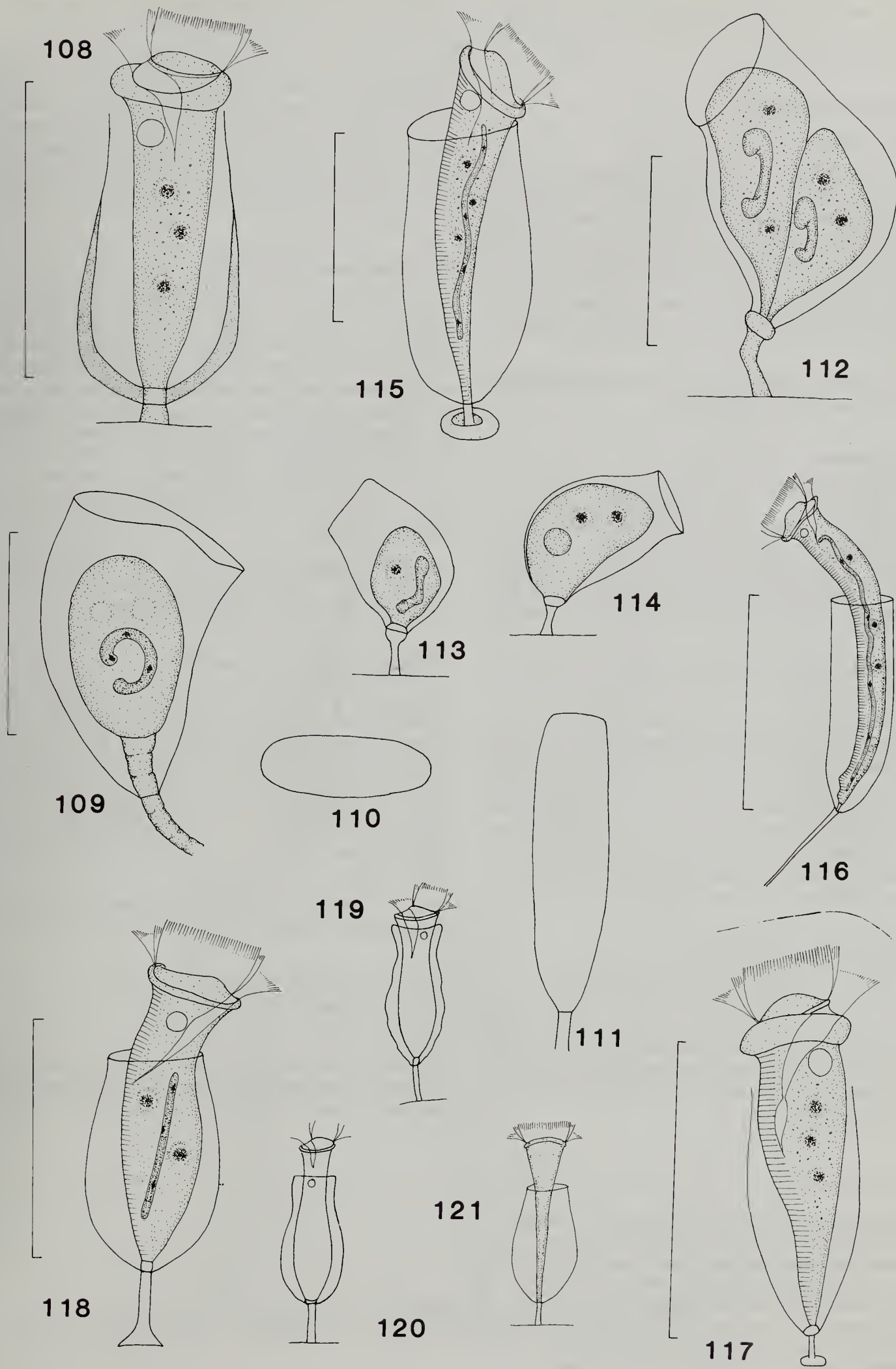
Figs 112–114 *Cothurnia limnorae*, after Dons, 1928; fig. 112 bar = 50 μm ; figs 113 & 114 showing variation in lorica and macronucleus.

Fig. 115 *Cothurnia macrodisca*, after Stiller, 1971, bar = 50 μm .

Fig. 116 *Cothurnia magna*, after Yunfen, 1980, bar = 200 μm .

Fig. 117 *Cothurnia membranoloricata*, after Stiller, 1968, bar = 50 μm .

Figs 118–121 *Cothurnia maritima*; fig. 118 after Felinska, 1965, bar = 50 μm ; fig. 119 after Jankowski, 1965 (called *Cothurnia cyathus*); fig. 120 after Andrussowa, 1886 (called *Cothurnia marina*); fig. 121 after Ehrenberg, 1838.



be present in Wang Jiayi's. Until more data are available there are not considered to be sufficient differences between *C. lapponum* and *C. lapponum naidongensis* for their recognition as separate taxa.

Cothurnia lata Kellicott, 1883

Cothurnia lata (Wailes, 1928) Kahl, 1935

DESCRIPTION (Figs 109–111). Lorica compressed dorso-ventrally, 70 μm long \times 40–45 μm wide \times 20 μm deep. Aperture elliptical when viewed from above. External stalk 20–25 μm long and curved; endostyle short; mesostyle absent. External stalk and endostyle with transverse furrows. Zooid 70 μm long \times 20 μm wide and just reaches aperture. CV situated at base of infundibulum. Macronucleus short, C-shaped and lies in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found as an epibiont of the copepod *Diaptomus* (Kellicott, 1883b).

Cothurnia limnoriae Dons, 1928

Tesnotheca limnoriae (Dons, 1928) Jankowski, 1987

DESCRIPTION (Figs 112–114). Lorica curved, 70–90 μm long \times 33–40 μm wide. Aperture 30–40 μm in diameter. External stalk 20–40 μm long; mesostyle short and broad; endostyle absent. Two zooids per lorica, each 60 μm long \times 40 μm wide. Macronucleus C-shaped, 30 μm long. Pellicular striations inconspicuous.

HABITAT. Marine, originally found as an epizoite of *Limnoria lignorum* (Dons, 1928).

NOTE. Jankowski (1987) erected the genus *Tesnotheca* for *C. limnoriae* on the basis that following binary fission the zooid grows asymmetrically with the peristome inclined to one side, whereas typical *Cothurnia* zooids are symmetrical. The symmetry of the zooid, however, has never previously been used for separating peritrich genera, and furthermore no description or diagram of an uncontracted zooid of *C. limnoriae* has been found in the literature. Therefore, *C. limnoriae* is retained in the genus *Cothurnia*.

Cothurnia longipes Kellicott, 1894

Cothurnia longipes (Mereshkowsky, 1879) Kahl, 1935

Cothurnia nodosa var. *longipes* Mereshkowsky, 1879

DESCRIPTION (Fig. 107). Lorica 100 μm long \times 35 μm wide. Aperture 30 μm in diameter. External stalk slender, 100–120 μm long; endostyle slender, 20–40 μm long; mesostyle absent. Zooid 55 μm long \times 25 μm wide when contracted. Pellicular striations inconspicuous.

HABITAT. Marine, originally isolated from the White Sea (Mereshkowsky, 1879); also found on sea-weeds and polyzoa from tide pools in North America (Kellicott, 1883a).

NOTE. This taxon was first described by Mereshkowsky (1879) under the name *C. nodosa* var. *longipes*, although it was renamed *C. longipes* by Kahl (1935). In the meantime, however, Kellicott (1894) isolated a similar organism from North America which he called *Cothurnia longipes*. Kellicott (1894) made no reference to Mereshkowsky's (1879) work. The two organisms appear to be synonymous thus solving the problem of homonymy.

Cothurnia macrodisca Stiller

DESCRIPTION (Fig. 115). Lorica 75 μm long \times 40 μm wide. Aperture 35 μm in diameter. External stalk 5–6 μm long, attached to substratum via conspicuous ring-like basal disc; mesostyle and endostyle absent. Zooid 90 μm long \times 15 μm wide, extending up to one sixth of its length beyond aperture. Peristomial lip well developed, 25 μm in diameter and inclined at angle to main body axis. Disc convex. CV situated just below peristome. Macronucleus vermiform and lies longitudinally in zooid. Pellicle with fine striations.

HABITAT. Freshwater, originally found attached to *Spirogyra* (see Stiller, 1971).

NOTE. The original description of *C. macrodisca* could not be located. Stiller (1971) cited Stiller as the authority for this species but did not give a date or reference.

Cothurnia magna Yunfen, 1980

DESCRIPTION (Fig. 116). Lorica 200 μm long \times 56 μm wide, cylindrical and tapering posteriorly towards stalk. Aperture 56 μm in diameter. External stalk 95 μm long \times 3 μm wide; endostyle short and slender; mesostyle absent. Zooid elongate, 280–300 μm long \times 25 μm wide and extending up to one third of its length beyond aperture. Peristomial lip 52 μm in diameter. Disc convex. CV situated just below peristome. Macronucleus vermiform and extends almost entire body length. Pellicle with fine striations.

HABITAT. Freshwater, originally isolated from Lake Dong, China (Yunfen, 1980).

Cothurnia maritima Ehrenberg, 1838

Cothurnia cyathus Jaworowski, 1893

Cothurnia marina Andrussowa, 1886

DESCRIPTION (Figs 118–121). Lorica 35–56 μm long \times 28–33 μm wide, occasionally with irregular ridges and furrows. Aperture 25 μm \times 17 μm . External stalk 10–15 μm long;

Fig. 122 *Cothurnia minutissima*, after Penard, 1914, bar = 50 μm .

Fig. 123 *Cothurnia mobiusi*, after Stiller, 1939, bar = 50 μm .

Fig. 124 *Cothurnia monoannulata*, after Banina and Polyakova, 1977.

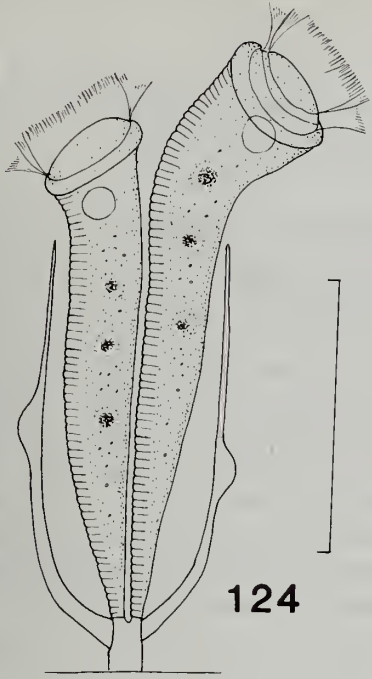
Fig. 125 *Cothurnia nereicola*, after Precht, 1935, bar = 50 μm .

Figs 126 & 127 *Cothurnia nitocrae*, after Precht, 1935, bar = 50 μm ; fig. 126 ventral view; fig. 127 lateral view.

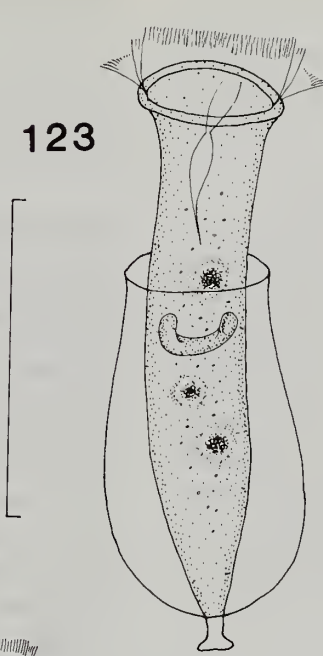
Figs 128 & 129 *Cothurnia nodosa*; fig. 128 after Claparede and Lachmann, 1858, bar = 50 μm ; fig. 129 after Kahl, 1935, bar = 50 μm .

Fig. 130 *Cothurnia obliqua*, after Bock, 1952, bar = 100 μm .

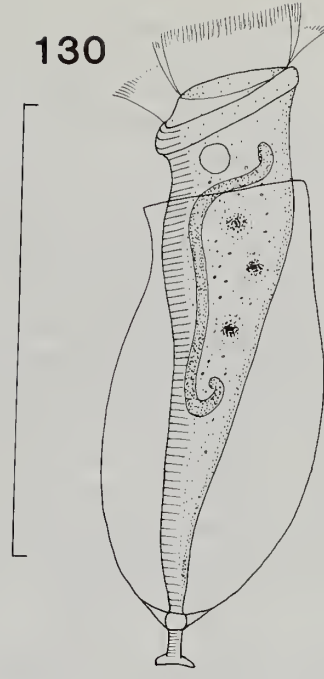
Fig. 131 *Cothurnia oblonga*, after Kahl, 1935, bar = 50 μm .



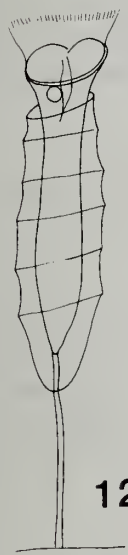
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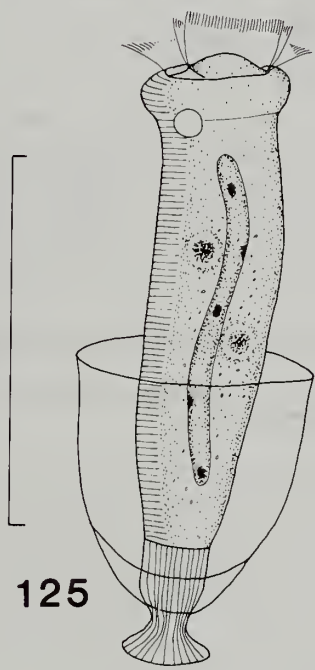
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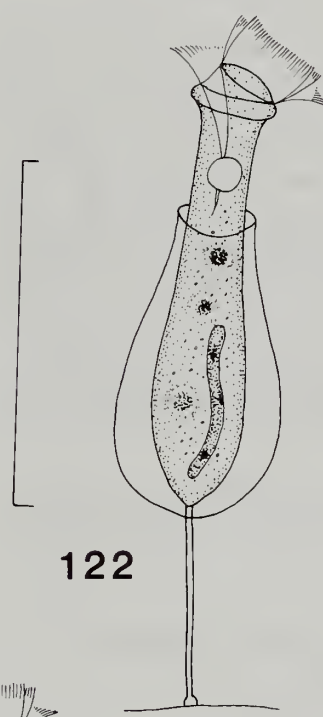
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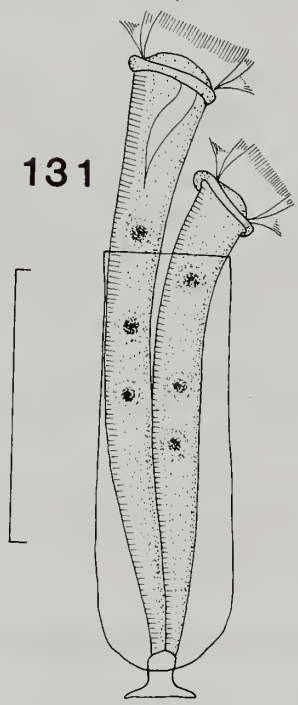
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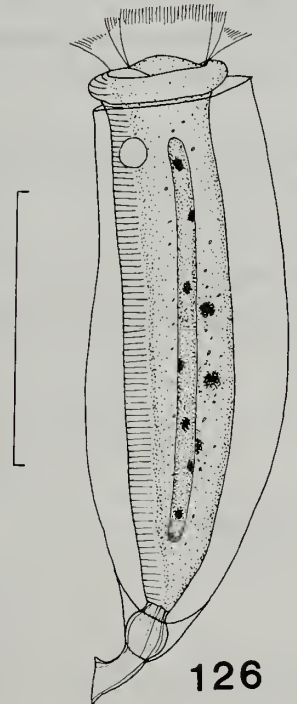
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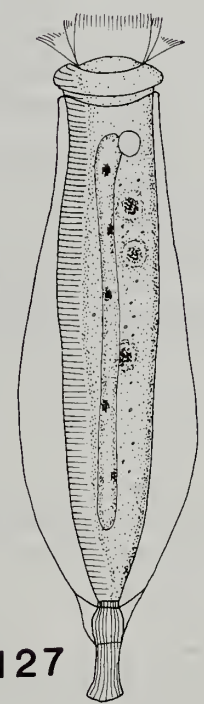
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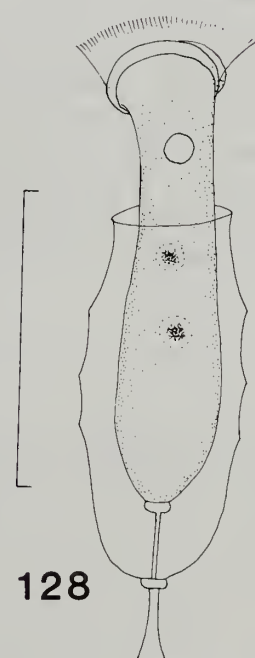
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endostyle short and broad; mesostyle absent. Zooid 60 μm long \times 12–15 μm wide, extending up to one third of its length beyond aperture. Peristomial lip 20–25 μm in diameter. CV situated near centre of infundibulum which is about one third zooid length. Macronucleus straight and lies longitudinally in body. Pellicle with fine striations.

HABITAT. Marine, attached to a variety of substrates.

NOTE. Several authors (Quennerstedt, 1865; Andrussowa, 1886; Möbius, 1888; Kahl, 1935; Stiller, 1939; Felinska, 1965) have described cothurnias under this name. The descriptions given by Quennerstedt (1865) and Felinska (1965) conform with Ehrenberg's (1838) original description, whereas those given by Möbius (1888), Kahl (1935) and Stiller (1939) show several differences; *C. maritima sensu* Möbius, 1888 was redescribed by Stiller (1939) under the name *C. mobiusi mihi* (= *C. mobiusi*); *C. sp.* ('bei *maritima*') Kahl, 1935 = *C. obliqua* Bock, 1952; and *C. maritima* Stiller, 1939 possesses a mesostyle whereas *C. maritima* Ehrenberg, 1838 does not.

Cothurnia membranoloricata Stiller, 1968

DESCRIPTION (Fig. 117). Lorica 40–45 μm long \times 18–23 μm wide. Aperture 20 μm in diameter. External stalk 8–12 μm long and attached to substrate via basal disc, 4–6 μm in diameter; endostyle short and broad; mesostyle absent. Zooid 55–57 μm long \times 12–15 μm wide, extending up to one quarter of its length beyond aperture. Peristomial lip well developed, 5 μm thick \times 15–18 μm in diameter. Disc convex. CV lies just below peristome. Pellicle clearly striated with 14–15 striations per 10 μm .

HABITAT. Marine, originally found attached to *Cladophora repens* and *C. heteronema* in Yugoslavian coastal waters (Stiller, 1968).

NOTE. *C. membranoloricata* was found by Viljoen and van As (1983) attached to the alga *Spirogyra*; it was misspelt *C. membraniloricata*.

Cothurnia minutissima (Penard, 1914) Kahl, 1935

Cothurnia sinuata Kahl, 1933

Cothurniopsis minutissima Penard, 1914

DESCRIPTION (Fig. 122). Lorica 35–50 μm long \times 18–27 μm wide and rounded posteriorly. Aperture 10–12 μm wide. External stalk slender, 6–17 μm long; endostyle short and slender; mesostyle absent. Zooid 50–55 μm long \times 10 μm wide, extending up to one third of its length beyond aperture. Peristomial lip well developed, 10 μm in diameter. Disc convex. CV large and situated near base of infundibulum.

Macronucleus straight and lies longitudinally in posterior half of zooid. Pellicle with fine striations.

HABITAT. Freshwater, originally found attached to moss (Penard, 1914); also found on detritus (Kahl, 1935) and on *Enteromorpha intestinalis* (Sommer, 1951).

Cothurnia mobiusi (Möbius, 1888) Stiller, 1939

Cothurnia maritima Möbius, 1888

Cothurnia mobiusi mihi (Möbius, 1888) Stiller, 1939

DESCRIPTION (Fig. 123). Lorica 50 μm long \times 30 μm wide. Aperture 20 μm in diameter and sometimes inclined at an angle to main lorica axis. External stalk short; mesostyle and endostyle absent. Zooid 70 μm long \times 15 μm wide, extending up to one half of its length beyond aperture. Peristomial lip 20 μm in diameter. CV situated one quarter of way down zooid. Macronucleus C-shaped and lies transversely in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Marine, isolated by Stiller (1939) from the North Sea near Helgoland.

NOTE. Stiller (1939) described a *Cothurnia* which conforms closely with *C. maritima* Möbius (1888) but clearly differs from Ehrenberg's (1838) *C. maritima*. Stiller (1939) called this organism *C. mobiusi mihi*, although the subspecies epithet *mihi* may be disregarded.

Cothurnia monoannulata Banina and Polyakova, 1977

Sincothurnia monoannulata (Banina and Polyakova, 1977) Jankowski, 1985

DESCRIPTION (Fig. 124). Lorica cylindrical, 68 μm long \times 32 μm wide and with a centrally located annular ridge. Aperture 29 μm in diameter. External stalk 4 μm long and penetrates lorica wall via special tube; mesostyle and endostyle absent. Two zooids per lorica, one larger than the other; larger zooid typically curved anteriorly, 90 μm long \times 15 μm wide and extends up to one third of its length beyond aperture; smaller zooid not curved, 80 μm long \times 12 μm wide and extends only one sixth of its length beyond aperture. Peristomial lip 18–20 μm in diameter. CV situated just beneath peristome. Pellicular striations conspicuous with convex ribbing between the striations.

HABITAT. Freshwater, originally found attached to *Cladophora* (Banina and Polyakova, 1977).

Cothurnia nereicola Precht, 1935

Semicothurnia nereicola (Precht, 1935) Jankowski, 1976

Fig. 132 *Cothurnia ovalis*, after Kahl, 1933, bar = 50 μm .

Figs 133 & 134 *Cothurnia ovata*, after Fromentel, 1874; fig. 133 bar = 100 μm ; fig. 134 macronucleus.

Fig. 135 *Cothurnia oviformis*, after Banina and Polyakova, 1977, bar = 50 μm .

Fig. 136 *Cothurnia parva*, after Bock, 1952, bar = 50 μm .

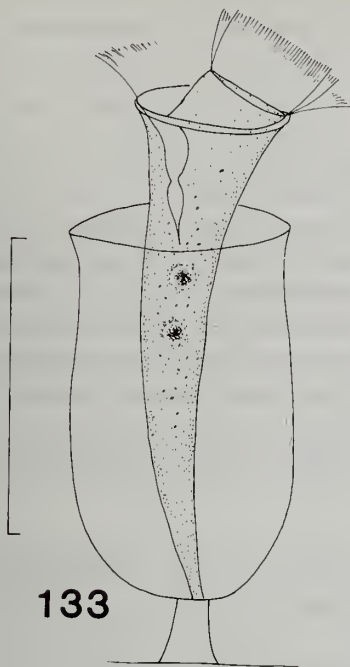
Fig. 137 *Cothurnia parvula*, after Felinska, 1965, bar = 50 μm .

Fig. 138 *Cothurnia patula*, after Fromentel, 1874, bar = 50 μm .

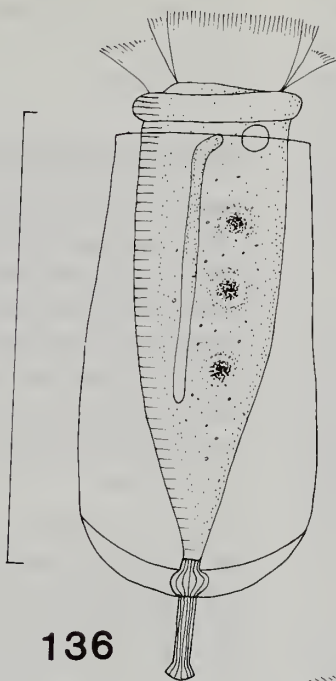
Figs 139 & 140 *Cothurnia peloscolicis*, after Precht, 1935, bar = 50 μm ; fig. 139 ventral view; fig. 140 lateral view.

Fig. 141 *Cothurnia plachteri*, after Matthes and Guhl, 1973, bar = 100 μm .

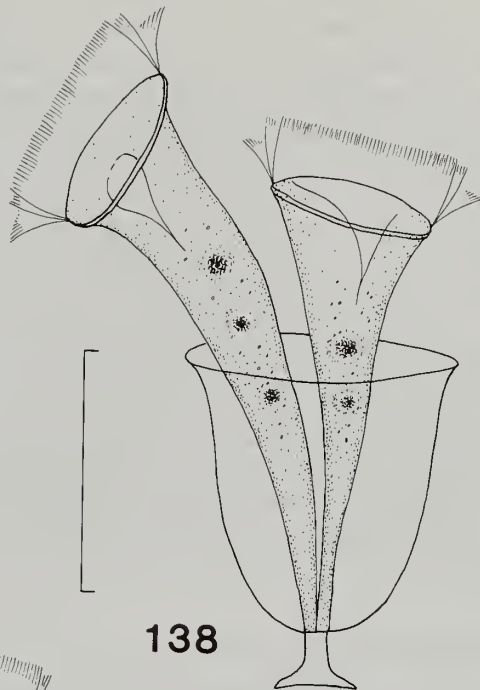
Fig. 142 *Cothurnia plectostyla*, after Stokes, 1885, bar = 100 μm .



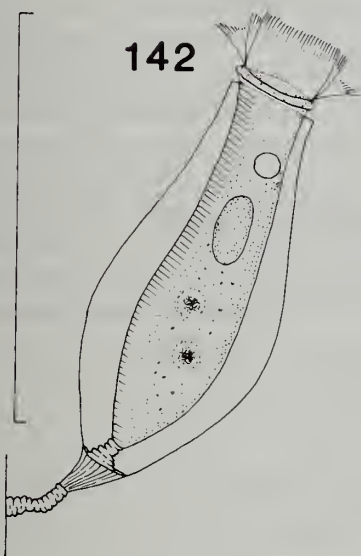
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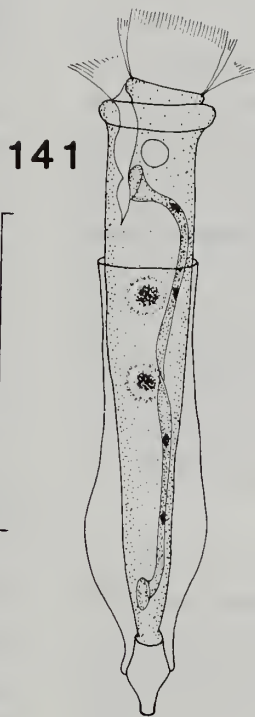
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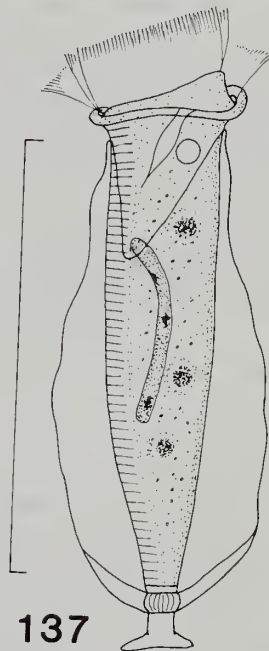
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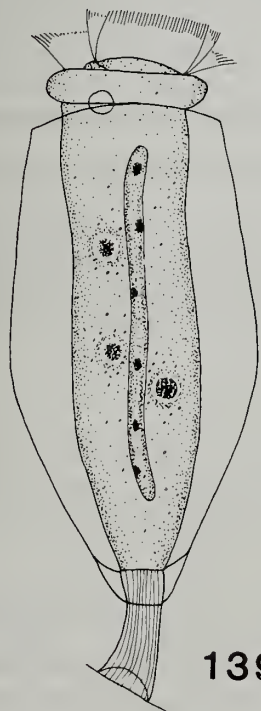
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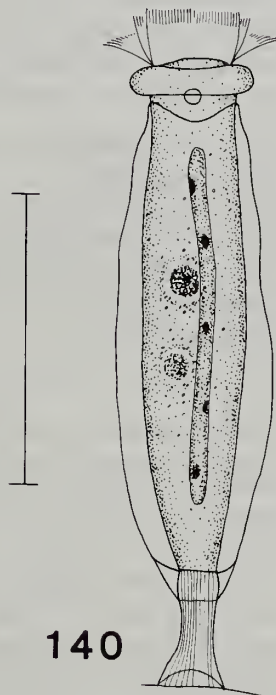
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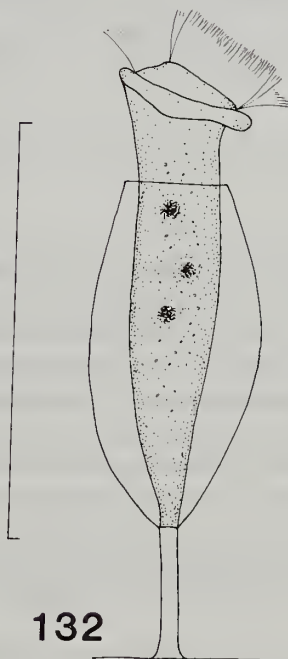
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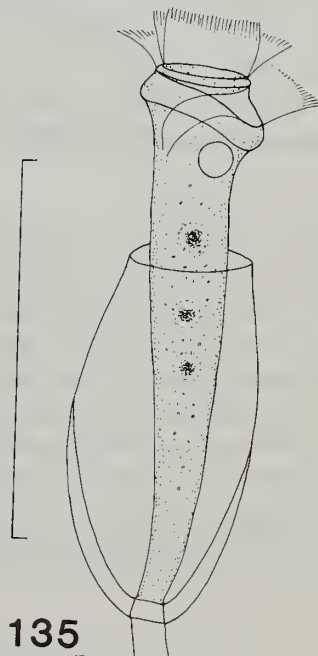
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DESCRIPTION (Fig. 125). Lorica almost hemispherical in shape, 33 μm long \times 30 μm wide. Aperture 30 μm in diameter. External stalk short and attached to substratum via basal disc, 10 μm in diameter; mesostyle and endostyle short and broad. All three stalks with continuous longitudinal striac. Zooid 65 μm long \times 18 μm wide, extending up to two thirds of its length beyond aperture. Peristomial lip well developed, 20 μm in diameter. Disc convex. CV situated just beneath peristome. Macronucleus straight and lies longitudinally in zooid. Pellicular striations conspicuous.

HABITAT. Marine, originally found as an epizoite of the polychaete *Nereis diversicolor* (Precht, 1935).

NOTE. Jankowski (1976) erected the genus *Semicothurnia* for this species (and for *C. acuta* Levander, 1915) on account of their unusual stalks. The stalk of *C. nereicola* is not, however, considered to be sufficiently distinct for the separation of a new genus.

Cothurnia nitocrae Precht, 1935

DESCRIPTION (Figs 126 & 127). Lorica 93–97 μm long \times 30–35 μm wide. Aperture oval when viewed from above, 30 μm \times 15 μm . External stalk, mesostyle and endostyle all short with continuous longitudinal striae. Zooid 95 μm long \times 20 μm wide and extends just beyond aperture. Peristomial lip 25 μm in diameter. CV situated near anterior end of macronucleus which is straight and 70 μm long. Pellicular striations conspicuous.

HABITAT. Marine, originally found as an epizoite of the harpacticoid copepod *Nitoura spinipes* (Precht, 1935).

Cothurnia nodosa Claparede and Lachmann, 1858

Cothurnia sahrhagei (Sahrhage) Kahl, 1933

DESCRIPTION (Figs 128 & 129). Lorica 58 μm long \times 26 μm wide and with one or more annular ridges. Aperture 20 μm in diameter. External stalk slender, 15–55 μm long; endostyle slender; mesostyle absent. Two zooids per lorica, each 70 μm long \times 15–18 μm wide and extending up to one third of its length beyond aperture. Peristomial lip 20 μm in diameter. CV situated beneath the peristome. Pellicle with fine striations.

HABITAT. Marine, originally found attached to algae (Claparede and Lachmann, 1858).

Cothurnia obliqua Bock, 1952

Cothurnia sp. Kahl, 1933

DESCRIPTION (Fig. 130). Lorica 95–96 μm long \times 44–45 μm wide. Aperture 37–38 μm in diameter. External stalk 5–7 μm long; mesostyle short and broad; endostyle short and inconspicuous. Zooid 110–115 μm long \times 28–30 μm wide, extending up to one fifth of its length beyond aperture. Peristomial lip 35 μm in diameter and inclined at an angle to main zooid axis. CV situated just below peristome. Macronucleus vermiform and curved at both ends. Pellicle with fine striations.

HABITAT. Brackish water, found by Kahl (1933) attached to green algae, and by Bock (1952) attached to *Ceramium diapharum*, both at Kiel.

NOTE. Kahl (1935) described a cothurnid (*Cothurnia* spec.) which he considered to be closely related to *C. maritima*

Ehrenberg, 1838. Bock (1952) subsequently isolated *C. obliqua* from the same location, noting the similarity between his and Kahl's (1933) organisms. The two are considered synonymous.

Cothurnia oblonga Kahl, 1935

DESCRIPTION (Fig. 131). Lorica 71–82 μm long \times 30–33 μm wide. Aperture 28–30 μm in diameter. External stalk 5 μm long; endostyle short and broad; mesostyle absent. Two zooids per lorica, 90–110 μm long \times 18 μm wide. One zooid typically larger than the other, the larger zooid extending up to one third of its length beyond aperture while the smaller one extends only one fifth. CV situated just below peristome. Macronucleus straight, about 70 μm long. Pellicular striations conspicuous.

HABITAT. Freshwater, attached to a variety of plant and animal substrates including *Lemna*, *Cladophora* and *Enteromorpha intestinalis* (Kahl, 1935; Sommer, 1951).

NOTE. *C. oblonga* was redescribed by Sommer (1951).

Cothurnia ovalis (Wailes, 1928) Kahl, 1933

Cothurnia innata Wailes, 1928

DESCRIPTION (Fig. 132). Lorica 40 μm long \times 22 μm wide. Aperture oval when viewed from above, 27 μm \times 14 μm . External stalk up to 27 μm long; mesostyle and endostyle absent. Zooid 50–58 μm long \times 12–18 μm wide, extending up to one third of its length beyond aperture. Peristomial lip 22 μm in diameter. Macronucleus short, curved and lies longitudinally in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Marine, originally isolated from Departure Bay, Vancouver (Wailes, 1928).

Cothurnia ovata Dujardin, 1841

Cothurniopsis ovata (Dujardin, 1841) Zelinka, 1928

DESCRIPTION (Figs 133 & 134). Lorica cylindrical, 125 μm long \times 75 μm wide. Aperture 75 μm in diameter. External stalk short and broad; mesostyle and endostyle absent. Zooid 175–200 μm long \times 25 μm wide, extending up to one third of its length beyond aperture. Peristomial lip 50 μm in diameter. Macronucleus elongate. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to *Conferva* (Fromentel, 1874).

NOTE. Zelinka (1928) transferred *C. ovata* to *Cothurniopsis* (= *Cothurnopsis*) Entz, 1884, but with the submergence of *Cothurnopsis* by Kahl (1935), this species returned to the genus *Cothurnia*.

Cothurnia oviformis Banina and Polyakova, 1977

DESCRIPTION (Fig. 135). Lorica asymmetric with one side flattened, 48 μm long \times 22 μm wide and tapers at both ends. Aperture 16 μm wide. External stalk 5 μm long \times 4 μm wide and penetrates lorica wall via special tube; mesostyle and endostyle absent. Zooid 73 μm long \times 12 μm wide, extending up to one half of its length beyond aperture. Peristomial lip 15 μm in diameter. CV situated just below peristome. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to *Cladophora* (Banina and Polyakova, 1977).

***Cothurnia parva* Bock, 1952**

DESCRIPTION (Fig. 136). Lorica 46–50 μm long \times 30–34 μm wide. Aperture 23–25 μm in diameter. External stalk 11–14 μm long; mesostyle short and broad; endostyle inconspicuous. All three stalks with conspicuous longitudinal striae. Zooid 49–54 μm long \times 17 μm wide, extending just beyond aperture. Peristomial lip 19–21 μm in diameter. CV situated just below peristome. Macronucleus straight and situated in upper two thirds of zooid. Pellicular striations conspicuous.

HABITAT. Brackish water, originally found attached to *Ceramium diaphanum* (Bock, 1952).

***Cothurnia parvula* Felinska, 1965**

DESCRIPTION (Fig. 137). Lorica 50–62 μm long \times 24 μm wide with irregular ridges and furrows. Aperture 15 μm wide and with deep cleft in border. External stalk, mesostyle and endostyle all short and broad; mesostyle with conspicuous longitudinal striae. Zooid 55 μm long \times 13 μm wide, extending just beyond aperture. Peristomial lip 17 μm in diameter. CV small and situated just below peristome. Macronucleus 20 μm long and lies longitudinally in centre of zooid. Pellicular striations conspicuous.

HABITAT. Marine, originally found attached to algae from laboratory aquaria at Plymouth (Felinska, 1965).

***Cothurnia patula* Fromentel, 1874**

Sincothurnia patula (Fromentel, 1874) Jankowski, 1985

DESCRIPTION (Fig. 138). Lorica 55 μm long \times 45 μm wide. Aperture 55 μm in diameter. External stalk short and broad; mesostyle and endostyle absent. Two zooids per lorica, each 110 μm long \times 20 μm wide and extending up to one half of its length beyond aperture. Peristomial lip 40 μm in diameter. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to algae (Fromentel, 1874).

***Cothurnia peloscolicis* Precht, 1935**

DESCRIPTION (Figs 139 & 140). Lorica compressed dorso-ventrally, 81 μm long \times 27–41 μm wide. Aperture oval when viewed from above, 15 μm \times 33 μm . External stalk 20 μm long; mesostyle short and broad; endostyle absent. External stalk and mesostyle with conspicuous longitudinal striae. Zooid 80 μm long \times 18–22 μm wide, extending just beyond aperture. Peristomial lip 27 μm in diameter. CV small and situated in peristomial region. Macronucleus straight, 50 μm long. Pellicular striations inconspicuous.

HABITAT. Marine, originally found as an epizoite of the oligochaete *Peloscolex benedeni* (Precht, 1935).

***Cothurnia plachteri* Matthes and Guhl, 1973**

DESCRIPTION (Fig. 141). Lorica elongate, 127 μm long \times 30 μm wide and tapering at posterior end. External stalk short and slender; endostyle broad; mesostyle absent. Zooid 118–

170 μm long \times 26 μm wide, extending up to one third of its length beyond aperture. Peristomial lip 34 μm in diameter. CV situated just below peristome. Macronucleus elongate and curved at both ends. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found attached to the crayfish *Astacus fluviatilis* and *A. torrentium* (Matthes and Guhl, 1973).

***Cothurnia plectostyla* Stokes, 1885**

DESCRIPTION (Fig. 142). Lorica 80–100 μm long \times 30–40 μm wide. Aperture 15–20 μm wide. External stalk 30 μm long, curved with lateral furrows; mesostyle broad with conspicuous longitudinal striae; endostyle short with irregular lateral furrows. Zooid 90 μm long \times 25 μm wide, extending just beyond aperture. Peristomial lip 25 μm in diameter. CV situated one quarter of way down zooid. Macronucleus ovoid, 20 μm long, and lies in centre of zooid. Pellicle with fine striations.

HABITAT. Freshwater, originally found attached to *Canthocamptus* (Stokes, 1885).

***Cothurnia propinqua* Kahl, 1933**

DESCRIPTION (Fig. 143). Lorica 60 μm long \times 23 μm wide and tapering posteriorly. Aperture 18 μm in diameter. External stalk 10–15 μm long and with irregular transverse furrows; mesostyle slender; endostyle inconspicuous. Zooid 55 μm long \times 10 μm wide, extending just beyond aperture. CV situated near base of infundibulum. Macronucleus short, C-shaped and lies obliquely across central region of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater.

***Cothurnia pupa* Eichwald, 1849**

DESCRIPTION (Fig. 144). Lorica ovoid, length about $\times 2$ width, and with three distinct centrally located annular ridges. External stalk slender, about one quarter of lorica length. Zooid conical in shape, extending just beyond aperture. Peristomial lip broad. Pellicular striations inconspicuous.

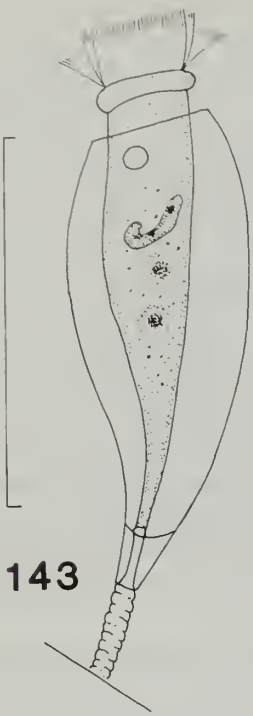
HABITAT. Freshwater.

NOTE. No dimensions were given in the original description and *C. pupa* has never been redescribed.

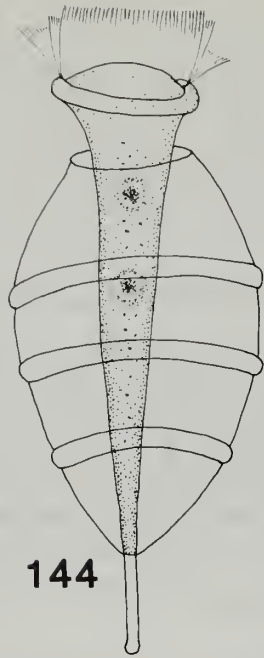
***Cothurnia recurva* Claparede and Lachmann, 1858**

DESCRIPTION (Figs 145 & 146). Lorica curved and irregular, 45–75 μm long \times 17–35 μm wide. Aperture 13–17 μm in diameter. External stalk up to 18 μm long, curved with transverse furrows; endostyle short and broad; mesostyle absent. Zooid 40–70 μm long \times 10–17 μm wide, extending just beyond aperture. Diameter of aperture slightly greater than that of lorica. CV small and situated one quarter of way down zooid. Macronucleus straight and lies longitudinally in centre of zooid. Pellicular striations conspicuous.

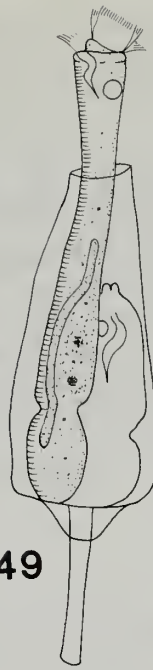
HABITAT. Marine, found as epizoites of cyclopoid and harpacticoid copepods (Kahl, 1933; Felinska, 1965).



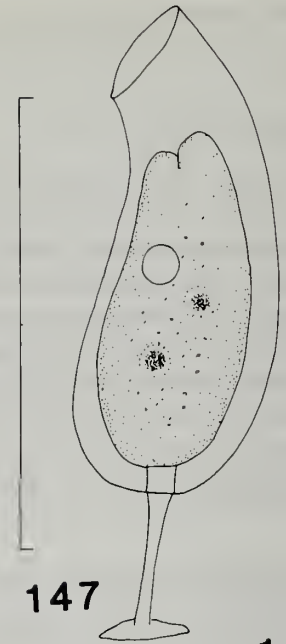
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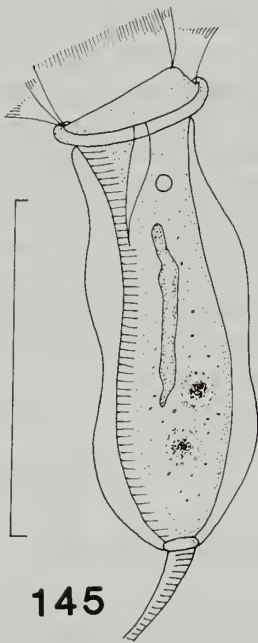


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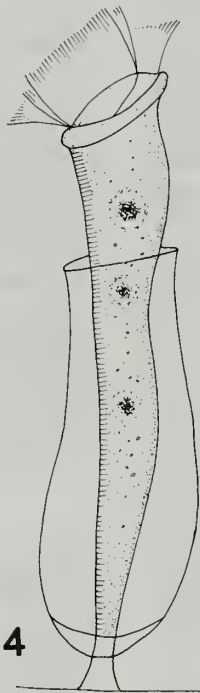
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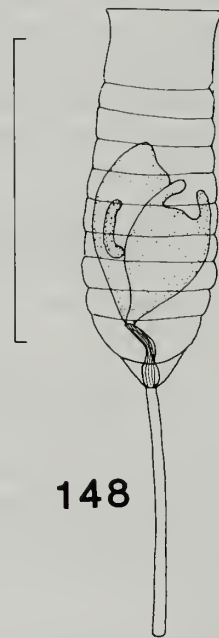
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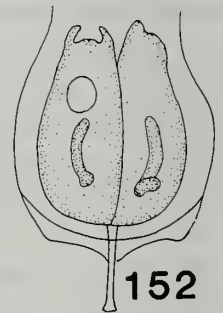
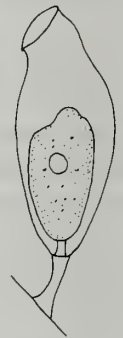
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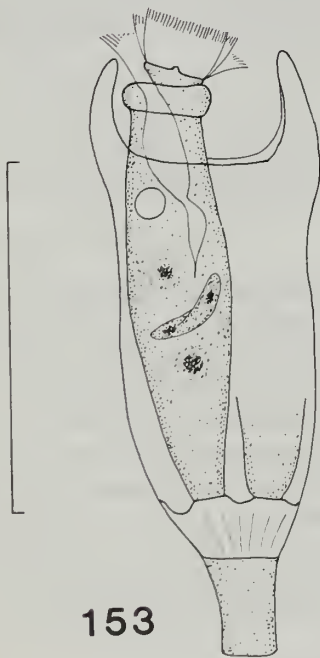
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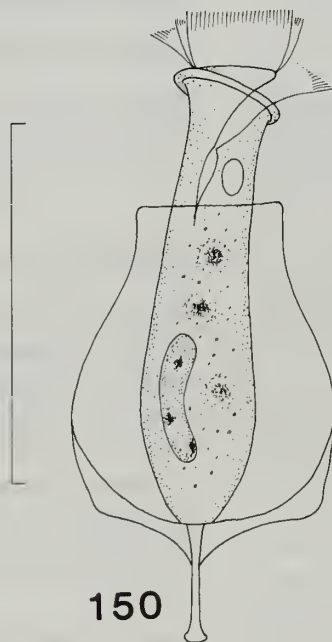
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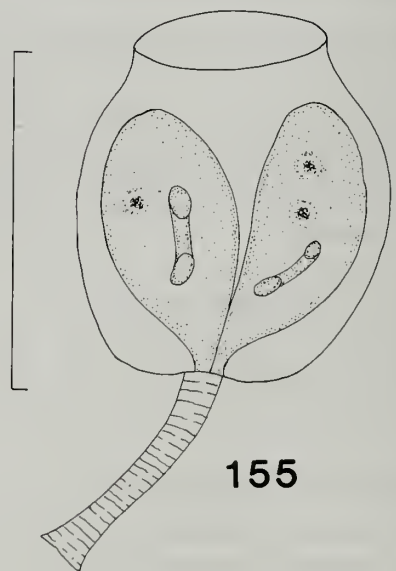
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***Cothurnia recurvata* Kahl, 1928**

DESCRIPTION (Fig. 147). Lorica 100 μm long \times 50 μm wide. Aperture 30 μm in diameter with curved neck. External stalk slender, 25 μm long attached to substratum via basal disc, 15 μm in diameter; endostyle short and broad; mesostyle absent. Zooid 75 μm long \times 40 μm wide when contracted.

HABITAT. Brackish water, originally found attached to algae (Kahl, 1928).

NOTE. *C. recurvata* is very similar to *C. recurva*, the principal differences being those of size, host and habitat. It is possible that re-examination will show these taxa to be synonymous.

***Cothurnia rhabdota* Bock, 1952**

Sincothurnia rhabdota (Bock, 1952) Jankowski, 1985

DESCRIPTION (Fig. 148). Lorica cylindrical, 125–130 μm \times 40–42 μm wide with several (about eight) annular furrows. External stalk 88–93 μm long; mesostyle short; endostyle 20–22 μm long. Mesostyle and endostyle with continuous longitudinal striae. Two zooids per lorica, each 55 μm long \times 28 μm wide when contracted. Macronucleus short, C-shaped and lies longitudinally in centre of zooid.

HABITAT. Marine, originally found attached to the red alga *Polysiphonia nigrescens* (Bock, 1952).

NOTE. Uncontracted specimens of this species have yet to be described.

***Cothurnia richtersi* (Penard, 1914) Kahl, 1935**

Cothurniopsis richtersi Penard, 1914

DESCRIPTION (Figs 150–152). Lorica 45–60 μm long \times 30–35 μm wide, rounded posteriorly. Aperture oval when viewed from above, 25 μm \times 13 μm . External stalk slender, 20 μm long; mesostyle short and slender; endostyle absent. Two zooids per lorica, each 80 μm long \times 20 μm wide, extending up to one third of its length beyond aperture. Peristomial lip 20 μm in diameter. CV situated near mid-region of infundibulum which reaches about one third zooid length. Macronucleus 20 μm long and lies either longitudinally or horizontally in posterior part of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, reported by Penard (1914) from both France and Antarctic regions.

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

***Cothurnia ruthae* Lüpkes, 1974**

DESCRIPTION (Fig. 149). Lorica conical in shape, 66 μm long \times 30 μm wide, posterior end flattened and broad. Aperture 12 μm in diameter. External stalk slender, 27 μm long; mesostyle short; endostyle absent. Two zooids per lorica, each 93 μm long \times 12 μm wide with annular constriction near posterior end. Peristomial lip 10 μm in diameter. Disc obliquely raised above peristome. Macronucleus irregular and lies longitudinally in posterior half of zooid. Pellicle with fine striations.

HABITAT. Freshwater, originally isolated from interstitial groundwater from the Fulda Valley (Lüpkes, 1974).

***Cothurnia sieboldii* Stein, 1854**

DESCRIPTION (Fig. 153). Lorica 113–132 μm long \times 30–49 μm wide with two horn-like processes projecting up and backwards on either side of aperture. External stalk and mesostyle both short and broad; endostyle absent. Two zooids per lorica, each 130 μm long \times 30 μm wide. Peristomial lip well developed, 30 μm in diameter. Infundibulum broad, almost reaching centre of zooid. CV situated about one third of way down zooid. Macronucleus short, curved or U-shaped, and lies in centre of zooid.

HABITAT. Freshwater, found on *Entomostraca* (Kahl, 1935) and also on the crayfish *Astacus fluviatilis* and *A. torrentium* (Matthes and Guhl, 1973).

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

***Cothurnia simplex* Kahl, 1933**

DESCRIPTION (Fig. 154). Lorica 50–60 μm long \times 23 μm wide. Aperture 18 μm in diameter. External stalk short and broad with longitudinal striae; mesostyle and endostyle short and inconspicuous. Zooid 90 μm long \times 15 μm wide, extending up to one quarter of its length beyond aperture. Peristomial lip 20 μm in diameter. CV situated just below peristome. Macronucleus vermiform and irregularly coiled. Pellicle with fine striations.

HABITAT. Marine, originally found attached to algae at Helgoland (Kahl, 1933), and at Plymouth (Felinska, 1965).

NOTE. *C. simplex* was redescribed by Felinska (1965).

Fig. 143 *Cothurnia propinqua*, after Kahl, 1933, bar = 50 μm .

Fig. 144 *Cothurnia pupa*, after Kent, 1881 (dimensions not available).

Figs 145 & 146 *Cothurnia recurva*; fig. 145 after Felinska, 1965, bar = 50 μm ; fig. 146 after Claparede and Lachmann, 1858.

Fig. 147 *Cothurnia recurvata*, after Kahl, 1935, bar = 100 μm .

Fig. 148 *Cothurnia rhabdota*, after Bock, 1952, bar = 100 μm .

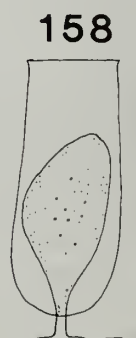
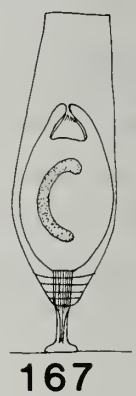
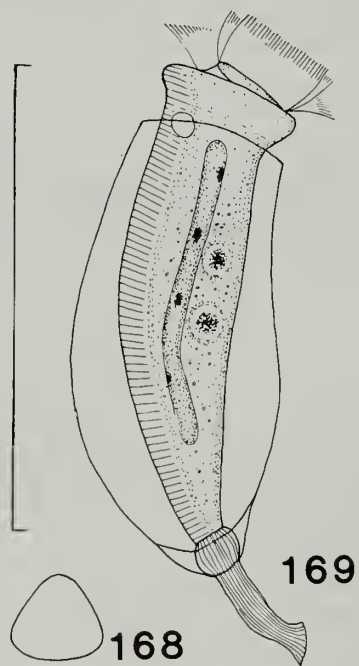
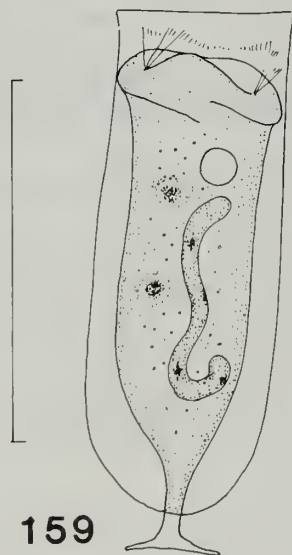
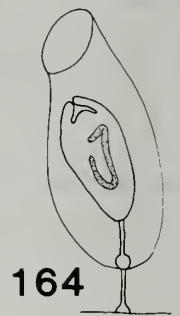
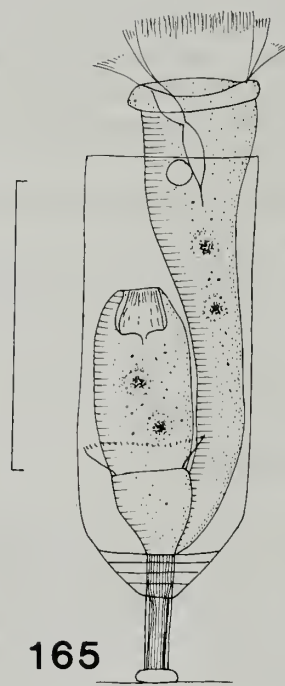
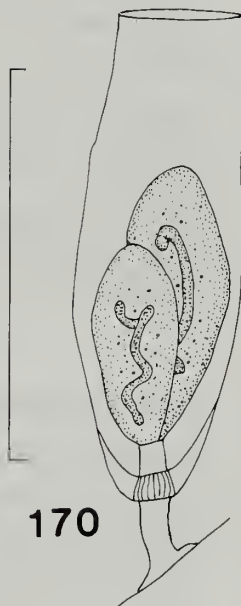
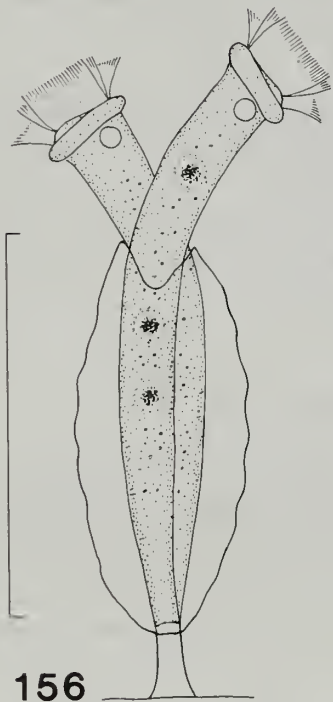
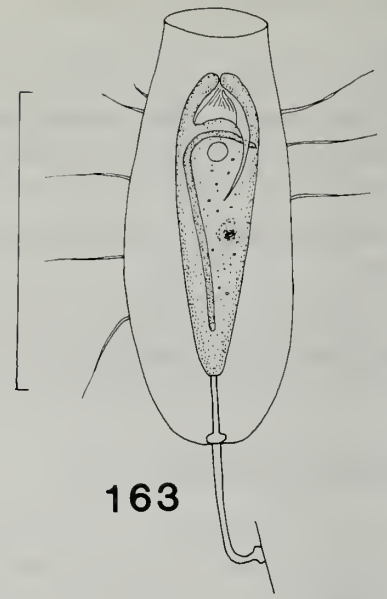
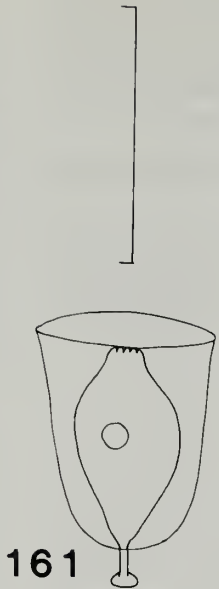
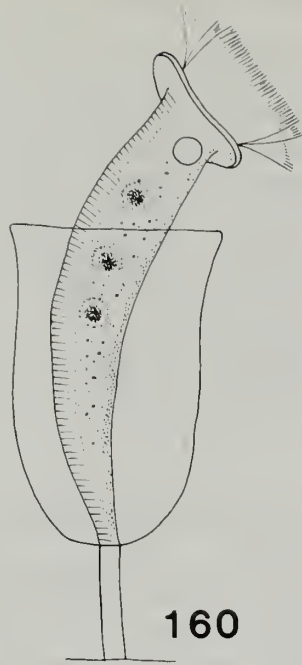
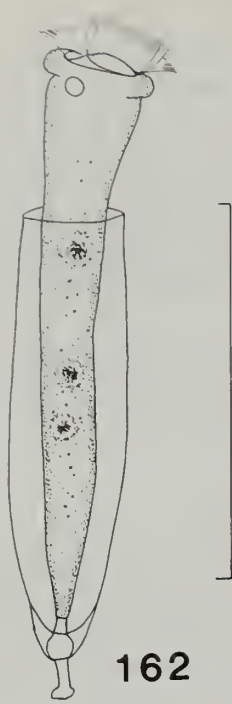
Fig. 149 *Cothurnia ruthae*, after Lüpkes, 1974, bar = 50 μm .

Figs 150–152 *Cothurnia richtersi*, after Penard, 1914; fig. 150 bar = 50 μm ; fig. 151 nuclei; fig. 152 lorica with two contracted zooids.

Fig. 153 *Cothurnia sieboldii*, after Matthes and Guhl, 1973, bar = 100 μm .

Fig. 154 *Cothurnia simplex*, after Kahl, 1933, bar = 50 μm .

Fig. 155 *Cothurnia subglobosa*, after Daday, 1911, bar = 50 μm .



Cothurnia sinuosa (Wailes, 1943) n. comb.*Cothurnia compressa*? Kahl, 1935*Cothurnia compressa* var. *sinuosa* Wailes, 1943*Sincothurnia sinuosa* (Wailes, 1943) Jankowski, 1985

DESCRIPTION (Figs 156 & 157). Lorica compressed dorso-ventrally, 90–100 μm long \times 35–40 μm long, tapering at both ends and with annular ridges. Aperture 40 μm \times 15 μm with two deep clefts. External stalk 10 μm long; endostyle short and inconspicuous; mesostyle absent. Two zooids per lorica, each 150 μm long \times 15 μm wide and extending up to one third of its length beyond aperture. Peristomial lip 25 μm in diameter. Pellicular striations inconspicuous.

HABITAT. Marine, originally found attached to algae from North America (Wailes, 1943).

Cothurnia soldida Vuxanovici, 1962

DESCRIPTION (Figs 158 & 159). Lorica 68 μm \times 30 μm wide, cylindrical and rounded posteriorly. Aperture 30 μm in diameter. External stalk short; mesostyle and endostyle absent. Zooid 65 μm long \times 20 μm wide, not reaching as far as aperture. CV situated near anterior end of macronucleus which is vermiform and curved at both ends. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found on decomposed plant material from Lake Fundeni, Bucharest (Vuxanovici, 1962).

Cothurnia spissa Fromentel, 1874*Cothurnia calix* (Wailes, 1928) Kahl, 1933

DESCRIPTION (Figs 160 & 161). Lorica inverted bell-shaped, 60 μm long \times 30–35 μm wide and rounded posteriorly. Aperture 36 μm in diameter. External stalk 10–12 μm long and slender; mesostyle and endostyle absent. Zooid 40 μm long \times 15 μm wide when contracted. CV centrally located. Pellicle clearly striated.

HABITAT. Freshwater, originally found attached to *Confervae* (Fromentel, 1874).

NOTE. *C. calix* (Wailes, 1928) Kahl, 1933 shows only minor differences from *C. spissa* with which it is here synonymised.

Cothurnia stylarioides Precht, 1935

DESCRIPTION (Fig. 162). Lorica cylindrical, 121 μm long \times 32 μm wide. Aperture 30 μm in diameter. External stalk 12 μm long and slender; mesostyle short and broad; endostyle inconspicuous. Zooid elongate, 145 μm long \times 20 μm in diameter, extending up to one third of its length beyond

aperture. Peristomial lip 30 μm in diameter. CV situated just beneath peristome. Pellicular striations inconspicuous.

HABITAT. Marine, originally found as an epizoite of the polychaete *Stylarioides plumosus* (Precht, 1935).

Cothurnia subglobosa (Daday, 1911) n. comb.*Cothurniopsis subglobosa* Daday, 1911

DESCRIPTION (Fig. 155). Lorica ovoid, 45–50 μm long \times 46–52 μm wide. Aperture 28–34 μm in diameter. External stalk 35–37 μm long; mesostyle and endostyle absent. Two zooids per lorica. Macronucleus C-shaped and lies longitudinally in centre of zooid.

HABITAT. Marine, originally isolated from the Antarctic region as an epizoite of the ostracod *Cythereis* (Daday, 1911).

NOTE. With the submergence of the genus *Cothurniopsis* by Kahl (1935), this species was transferred to *Cothurnia*. If, however, coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

Cothurnia subtilis Stiller, 1939

DESCRIPTION (Figs 163 & 164). Lorica 65–72 μm long \times 28 μm wide. Aperture 20 μm in diameter. External stalk 25–30 μm long; endostyle 10–15 μm long and slightly swollen at distal end; mesostyle absent. Contracted zooid 50 μm long \times 15 μm wide. Macronucleus J-shaped. Pellicular striations inconspicuous.

HABITAT. Marine, originally found attached to *Mytilus edulis* (Stiller, 1939).

NOTE. Uncontracted specimens of this species have yet to be described.

Cothurnia tekirghiolica Tucolesco, 1962

DESCRIPTION (Figs 165–167). Lorica 80 μm long \times 30 μm wide. Aperture oval when viewed from above, 30 μm \times 20 μm . External stalk 15 μm long with irregular ridges and furrows; mesostyle short; endostyle short and inconspicuous. All three stalks with continuous longitudinal striae. Zooid 80 μm long \times 20 μm wide, extending up to one third of its length beyond aperture. Peristomial lip well developed, 25 μm in diameter. CV situated near base of infundibulum. Macronucleus C-shaped and lies longitudinally in the centre of zooid. Pellicle clearly striated.

HABITAT. Freshwater, originally found attached to *Cladophora* from Lake Tekirghiol (Tucolesco, 1962).

Figs 156 & 157 *Cothurnia sinuosa*, after Wailes, 1943, bar = 100 μm .

Figs 158 & 159 *Cothurnia soldida*, after Vuxanovici, 1962, bar = 50 μm .

Figs 160 & 161 *Cothurnia spissa*; fig. 160 after Kahl, 1933, bar = 50 μm (called *Cothurnia calix*); fig. 161 after Fromentel, 1874.

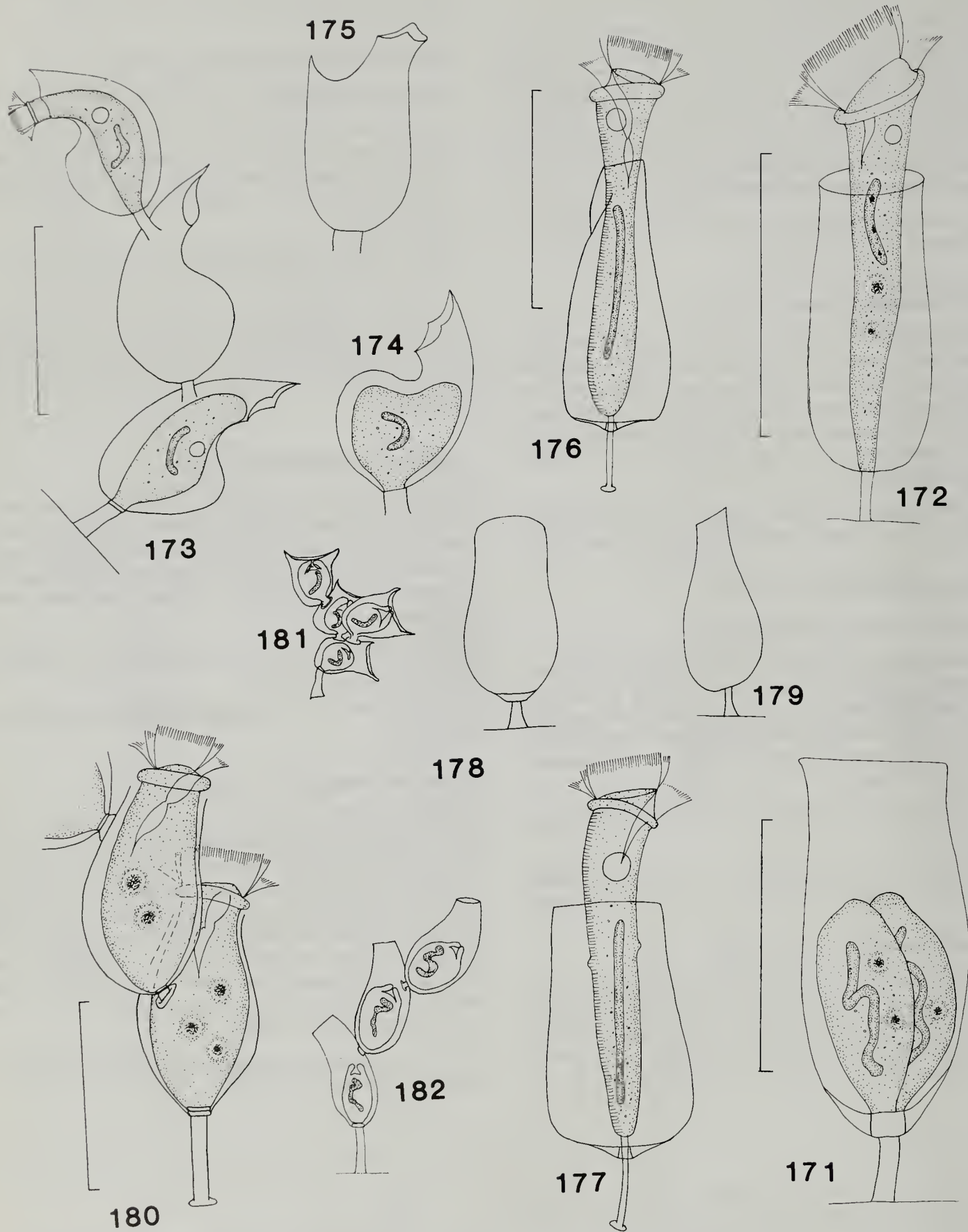
Fig. 162 *Cothurnia stylarioides*, after Precht, 1935, bar = 100 μm .

Figs 163 & 164 *Cothurnia subtilis*, after Stiller, 1939, bar = 50 μm .

Figs 165–167 *Cothurnia tekirghiolica*, after Tucolesco, 1962; fig. 165 with developing telotroch, bar = 50 μm ; fig. 166 external stalk and endostyle; fig. 167 contracted zooid.

Figs 168 & 169 *Cothurnia triangula*, after Precht, 1935; fig. 168 aperture, anterior view; fig. 169 bar = 50 μm .

Fig. 170 *Cothurnia trophoniae*, composite after Dons, 1946, bar = 100 μm .



***Cothurnia triangula* Precht, 1935**

DESCRIPTION (Figs 168 & 169). Lorica curved, 45 μm long \times 18 μm wide. Aperture triangular when viewed from above, 14 μm across. External stalk curved, 10–15 μm long; mesostyle short and broad; endostyle short and inconspicuous. All three stalks with conspicuous longitudinal striae. Zooid 40–45 μm long \times 12 μm wide, extending just beyond aperture. Peristomial lip well developed, 14 μm in diameter. CV situated near anterior end of macronucleus which is 27 μm long and lies longitudinally in zooid. Pellicle clearly striated.

HABITAT. Marine, originally found as an epibiont of the halacarid *Copidognathus fabriciusi* and the ostracod *Cythereis tuberculata* (Precht, 1935).

***Cothurnia trophoniae* Dons, 1946**

Cothurnia pedunculata Dons, 1918

Cothurnia nodosa Mereschkowsky, 1879 (in part) Dons, 1918

DESCRIPTION (Fig. 170). Lorica roughly cylindrical, 125–140 μm long \times 40–50 μm wide. External stalk 65–135 μm long; mesostyle short and broad with conspicuous longitudinal striae; endostyle short. Two zooids per lorica, each 70 μm long \times 35 μm wide when contracted. Macronucleus vermiform and coiled irregularly. Pellicular striations inconspicuous.

HABITAT. Marine, found as an epibiont of the alga *Polysiphonia violacea* (Dons, 1918), the polychaetes *Trophonia plumosa* and *Stylarioides plumosus* (Dons, 1946; Precht, 1935), the cnidarian *Laomedea loveni* and the pantopod *Pallene brevirostris* (Precht, 1935).

NOTE. Dons (1946) applied the name *C. trophoniae* to *C. nodosa* Mereschkowsky, 1879, an organism which Dons (1918) had previously redescribed under the name *C. pedunculata*. It is unclear why Dons (1946) chose not to use the name *C. pedunculata* for this species as it would appear to have priority over the name *C. trophoniae*. Furthermore, if coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*. *C. trophoniae* was redescribed by Precht (1935).

***Cothurnia trophonicola* Dons, 1946**

DESCRIPTION (Fig. 171). Lorica irregular and variable in shape, 60–85 μm long \times 31–35 μm wide. Aperture oval when viewed from above, 12–16 μm \times 30–33 μm . External stalk 5–15 μm long \times 3–4 μm wide; mesostyle 4–6 μm long \times 6–8 μm wide; endostyle absent. Two zooids per lorica, each 50 μm long \times 25 μm wide when contracted. Macronucleus vermiform and coiled irregularly. Pellicular striations inconspicuous.

HABITAT. Marine, originally found as an epizoite of the polychaete *Trophonia plumosa* (Dons, 1946).

NOTE. If coloniality (*sensu* Jankowski, 1985) is accepted as a generic character, this species should be included in the genus *Sincothurnia*.

***Cothurnia vaga* Roux, 1901**

DESCRIPTION (Fig. 172). Lorica cylindrical, 100 μm long \times 45 μm wide and rounded posteriorly. External stalk short and slender; mesostyle and endostyle absent. Zooid 140 μm long \times 30 μm wide, extending up to one third of its length beyond aperture. Peristomial lip 45 μm in diameter. CV situated beneath peristome. Macronucleus short, curved and lies in centre of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, originally found as an epizoite of the crustaceans *Cyclops* and *Gammarus* (Roux, 1901).

***Cothurnia variabilis* Kellicott, 1883**

Cothurnia variabilis var. *emarginata* (Kellicott, 1883a) Stokes, 1888

Daurotheca variabilis (Kellicott, 1883) Jankowski, 1987

Daurotheca marginata (Kellicott, 1883) Jankowski, 1987

DESCRIPTION (Figs 173–175). Lorica 75–130 μm long, variable in shape but usually rounded posteriorly and with curved neck. One or more spines may be present either near aperture or at posterior end of lorica. Aperture 30–40 μm wide. External stalk short and broad; mesostyle and endostyle absent. May form pseudocolonies with several loricas attached to each other via their external stalks to form chains. Two zooids per lorica, each 75–130 μm long \times 25–45 μm wide and extending just beyond aperture. Diameter of peristomial lip slightly less than maximum body width. Infundibulum broad and reaches one third of zooid length. CV situated near centre of zooid. Macronucleus C-shaped and lies either in centre or in lower half of zooid. Pellicular striations inconspicuous.

HABITAT. Freshwater, found as an epizoite of the crayfish *Cambarus diffinis*, *C. propinquus*, *C. bartonii*, *C. affinis*, *Astacus leptodactylus* and *A. fluviatilis* (Kellicott, 1883a; Nenninger, 1948; Krucinska and Simon, 1968).

NOTE. Jankowski (1987) transferred this species and *C. variabilis* var. *emarginata* Kellicott, 1883 (as *Daurotheca marginata*) to *Daurotheca*. However, since *Daurotheca* is of uncertain taxonomic status (see Incertae Sedis), *C. variabilis* is retained in the genus *Cothurnia*.

Genus *COTHURNIOPSIS* Stokes, 1893

The genus *Cothurniopsis* was erected by Stokes (1893) for peritrichs which resemble *Cothurnia* in every respect save

Fig. 171 *Cothurnia trophonicola*, after Dons, 1946, bar = 50 μm .

Fig. 172 *Cothurnia vaga*, after Roux, 1901, bar = 100 μm .

Figs 173–175 *Cothurnia variabilis*; fig. 173 chain of individuals forming a pseudocolony, bar = 100 μm ; figs 174 & 175 after Kellicott, 1883 (fig. 175—called *Cothurnia variabilis* var. *emarginata*).

Figs 176–179 *Cothurniopsis valvata*; figs 176 & 177 composite after Penard, 1914, bar = 50 μm (called *Cothurniopsis elastica*); figs 178 & 179 composite after Stokes, 1893.

Figs 180–182 *Dimorphocothurnia nebaliae*; figs 180 & 181 after Jankowski, 1985, bar = 100 μm ; fig. 182, after Dons, 1928.

one, that is the lateral borders of the lorica are pliable and are used to close the aperture when the ciliate contracts. By contrast *Cothurnia* has no mechanism of closing its aperture.

The name *Cothurniopsis* has, on several occasions, been erroneously confused with Entz's (1884) genus *Cothurnopsis*. According to Entz (1884) the principal characters by which *Cothurniopsis* is distinguished from *Cothurnia* are the possession of, (i) a large, transversely folded external stalk, and (ii) a compact macronucleus. Like *Cothurnia*, *Cothurniopsis* has no mechanism for closing its aperture. Unfortunately the similarity of the two names *Cothurniopsis* and *Cothurnopsis* has led to some confusion. For example Penard (1914), Zelinka (1928) and Kahl (1935) have either transferred existing species or described new species using the generic name *Cothurniopsis*. Yet in almost every case, the organisms concerned conformed to *Cothurnopsis* (*sensu* Entz, 1884) rather than *Cothurniopsis* (*sensu* Stokes, 1893). Jankowski (1985) cites other examples of such errors.

Stokes (1893) described a single species of *Cothurniopsis*, *C. valvata*, which became the type species by monotypy. *Cothurniopsis elastica* Penard, 1914 is the only cothurnid described since which possesses a closeable aperture.

Diagnosis of *Cothurniopsis*

Lorica erect and borne upon a stalk. Aperture border pliable and closes aperture when zooid contracts.

Key to the species of *Cothurniopsis*

- 1 Anterior lateral borders pliable and close aperture upon contraction of zooid(s) *C. valvata*

Species description

Cothurniopsis valvata Stokes, 1893

Cothurnia elastica (Penard, 1914) Kahl, 1935

Cothurnia valvata (Stokes, 1893) Kahl, 1935

Cothurniopsis elastica Penard, 1914

DESCRIPTION (Figs 176–179). Lorica 50–70 μm long \times 25–35 μm wide and rounded posteriorly. Aperture oval when viewed from above, 20 μm long \times 10 μm wide. External stalk 10–18 μm long. Zooid 75–80 μm long \times 10–15 μm wide, extending up to one third of its length beyond aperture. CV situated in anterior half of body. Macronucleus straight and lies longitudinally in posterior half of body. Pellicle with fine striations.

HABITAT. Brackish or freshwater, originally found attached to filamentous algae from Coney Island, New York, USA (Stokes, 1893); also isolated from moss in Europe (Penard, 1914).

NOTE. Penard (1914) described several species under the generic name *Cothurniopsis* although only one, *C. elastica*, has pliable lateral borders enabling the aperture to be closed. *C. elastica* shows only minor differences from *C. valvata* so the two are synonymised.

Genus *CYCLODONTA* Matthes, 1958

The genus *Cyclodonta* was erected by Matthes (1958) for *Cothurnia bipartita* Stokes, 1885, which differs from other

species of *Cothurnia* in that the zooid is attached to the inside of the lorica via a series of membranes rather than via an endostyle or mesostyle. In all other respects, *Cyclodonta* resembles *Cothurnia*. *C. bipartita* is the only species of *Cyclodonta* and so becomes the type species by monotypy.

Cyclodonta is commonly included in the family Vaginicolidae (Corliss, 1979; Foissner, 1979), although according to Stiller (1971) it should belong to the family Lagenophryidae because of its mode of development.

Diagnosis of *Cyclodonta*

Lorica borne upon a short stalk and without valves or other means of closing aperture. Zooid attached to lorica via a series of membranes. Mesostyle and endostyle absent. Single species genus.

Key to the species of *Cyclodonta*

- 1 Zooid attached to the lorica via a series of membranes *C. bipartita*

Species description

Cyclodonta bipartita (Stokes, 1885) Matthes, 1958

Cothurnia affinis (Kahl, 1935) Matthes, 1958

Cothurnia bipartita Stokes, 1885

Cothurniopsis rheotypica (Stiller, 1931) Felinska, 1965

Cothurnia trilobata (Sramek-Husek, 1957) Matthes, 1958

Cothurnia voighti (Voigt, 1902) Kahl, 1935

Cothurniopsis longipes Voigt, 1902

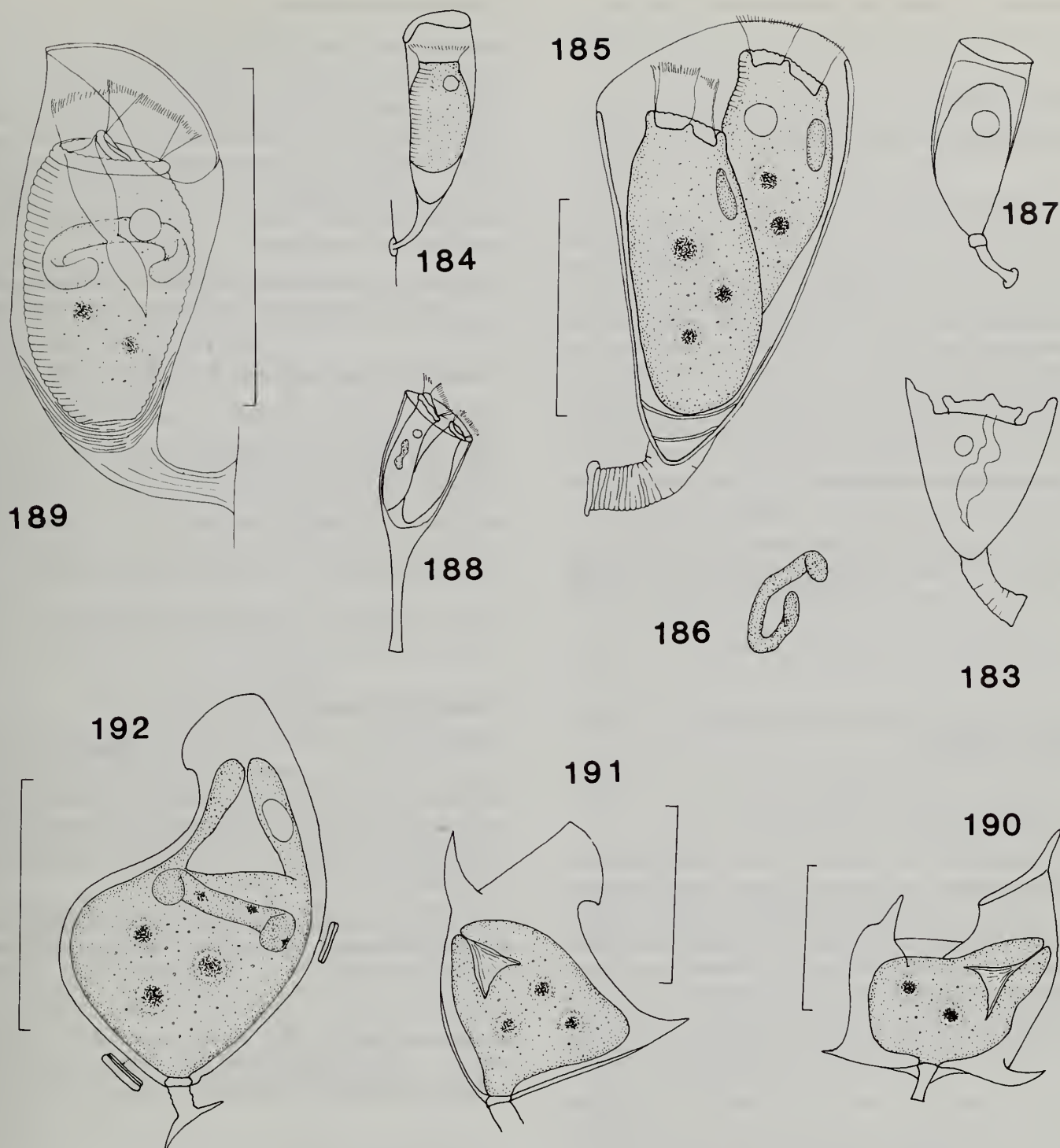
DESCRIPTION (Figs 183–189). Lorica curved, 78–132 μm long \times 40–70 μm wide with fine, longitudinal striae. Aperture 40–70 μm in diameter. External stalk curved, 20 μm long, with transverse furrows. 2–6 membranes present at posterior end of lorica; mesostyle and endostyle absent. Zooid 40–105 μm long \times 29–62 μm wide, not extending as far as aperture. CV empties into infundibulum via short channel. Macronucleus variable in shape, from short and curved to vermiform. Pellicle clearly striated with convex ribbing between striations.

HABITAT. Freshwater, commonly found attached to harpacticoid copepods (Matthes, 1958; Jankowski, 1985); also found attached to the crayfish *Cambarus affinis* and *Astacus leptodactylus* (Krucinska and Simon, 1968).

NOTE. *Cyclodonta bipartita* has been isolated by several workers including Voigt (1902), Penard (1914), Kahl (1935), Matthes (1958) and Foissner (1979), and in every case the host was a freshwater harpacticoid copepod. Indeed Jankowski (1985) has suggested that the absence of *Cothurnia* from these hosts is due to its substitution by *Cyclodonta*. However, *Cyclodonta* does not appear to be confined exclusively to harpacticoid copepod hosts as suggested by Jankowski (1985), since it has also been isolated (as *Cothurnia bipartita*) from the crayfish *Cambarus affinis* and *Astacus leptodactylus* (Krucinska and Simon, 1968).

Genus *DIMORPHOCOTHURNIA* Jankowski, 1980

The genus *Dimorphocothurnia* was first mentioned by Jankowski (1980), although a full generic description did not appear until five years later (Jankowski, 1985). *Dimorpho-*



Figs 183–189 *Cyclodonta bipartita*; fig. 183 after Sramek-Husek, 1957 (called *Cothurnia trilobata*); fig. 184 after Stokes, 1885; figs 185 & 186 after Matthes, 1958 (fig. 185 bar = 50 μm ; fig. 186 macronucleus); fig. 187 after Voigt, 1902 (called *Cothurnia longipes*); fig. 188 after Stiller, 1931 (called *Cothurniopsis rheotypica*); fig. 189 after Foissner, 1979, bar = 50 μm .

Fig. 190 *Daurotheca tespa*, after Jankowski, 1987, bar = 50 μm .

Fig. 191 *Daurotheca transoceanica*, after Jankowski, 1987, bar = 50 μm .

Fig. 192 *Daurotheca ussurina*, after Jankowski, 1987, bar = 50 μm .

cothurnia was erected for *Cothurnia nebaliae* Dons, 1928 which typically forms pseudocolonies with several individuals attached to each other via their external stalks to form chains. Although other species of *Cothurnia*, e.g. *C. bavarica* and *C. variabilis*, also form pseudocolonies they differ from *Dimorphocothurnia* in one important respect; that is, in *C. bavarica* and *C. variabilis* all the individual loricas of any chain are identical, whereas *Dimorphocothurnia* exhibits lorica dimorphism with the individual in contact with the substratum ('basont' Jankowski, 1985) having a longer stalk than those of the rest of the chain. *D. nebaliae* is the only species of *Dimorphocothurnia* and is the type species by monotypy.

Diagnosis of *Dimorphocothurnia*

Lorica without valves or any other means of closing aperture. Forms pseudocolonies with several loricas joined together via their external stalks to form chains. Exhibits lorica dimorphism with lorica in contact with substratum ('basont') having longer external stalk than those in rest of chain. Single species genus.

Key to the species of *Dimorphocothurnia*

- 1 Forms pseudocolonies and exhibits lorica dimorphism

with individual in contact with substratum having longer external stalk than others in chain *D. nebaliae*

Species description

Dimorphochothurnia nebaliae (Dons, 1928) Jankowski, 1985

Cothurnia nebaliae Dons, 1928

DESCRIPTION (Figs 180–182). Lorica 100–120 μm long \times 40–55 μm wide. Aperture 20–35 μm in diameter. Forms pseudocolonies with several loricas joined together via their external stalks to form chains. External stalk of individual in contact with substratum ('basont'), 30–40 μm long \times 6–7 μm wide; those of rest of chain, 5 μm long \times 6–7 μm wide. Mesostyle short and broad; endostyle absent. Zooid 140 μm long \times 60 μm wide and extends just beyond aperture. Peristomial lip well developed, 50 μm in diameter. Disc convex. Macronucleus vermiform, 40–50 μm long and irregularly coiled. Pellicular striations inconspicuous.

HABITAT. Marine, originally isolated from Norwegian coastal waters attached to the phyllocarid *Nebalia bipes* (Dons, 1928); also isolated from phyllocarids by Jankowski (1980, 1985).

INCERTAE SEDIS

Genus *DAUROTHECA* Jankowski, 1987

The genus *Daurotheca* was erected by Jankowski (1987) for cothurnids which have asymmetrical loricas and zooids, and exhibit a tendency to form spines on their loricas. Neither feature has previously been used for separating peritrich genera, and data on their reliability as taxonomic characters is scarce. In all other respects *Daurotheca* resembles *Cothurnia*.

Two cothurnids, *Cothurnia variabilis* Kellicott, 1883 and *C. variabilis* var. *emarginata* Kellicott, 1883 were transferred by Jankowski (1987) to *Daurotheca*. However, until the taxonomic status of *Daurotheca* has been established these taxa should remain in the genus *Cothurnia*. Jankowski (1987) also described three new species, *Daurotheca transoceanica*, *D. tespa* and *D. ussurina*.

Diagnosis of *Daurotheca*

Lorica asymmetrical, often with spines. Attached to substratum via external stalk. Aperture narrow, inclined at oblique angle to main lorica axis. Neck short. Zooid asymmetrical and bends to one side upon contraction.

Key to the species of *Daurotheca*

- | | | |
|---|--|-------------------------|
| 1 | Lorica with spines | 2 |
| | Lorica without spines | <i>D. ussurina</i> |
| 2 | Lorica with two spines, one subapical, one basal | <i>D. transoceanica</i> |
| | Lorica with four spines, one apical, one subapical and two basal | <i>D. tespa</i> |

Species descriptions

Daurotheca tespa Jankowski, 1987

DESCRIPTION (Fig. 190). Lorica trapezoid, 86–92 μm long \times 58–64 μm wide and with four spines, one broad apical (20 μm long), one slender subapical (14 μm long), and two basal (8 μm long). Apical and subapical spines point upwards, basal spines horizontally. Aperture held at angle to main lorica axis on short, broad neck. External stalk short; mesostyle and endostyle absent.

HABITAT. Freshwater, originally found attached to the gills of the crustacean *Pacifastacus lenisculus* (Jankowski, 1987).

Daurotheca transoceanica Jankowski, 1987

DESCRIPTION (Fig. 191). Lorica roughly triangular, 69–74 μm long \times 60–75 μm wide. Anterior region constricted to form a neck. Dorsal side of neck straight, 29–33 μm long. Aperture 22–25 μm wide. Lorica with two spines, one subapical 21 μm long, the other basal 10 μm long. External stalk up to 8 μm long; mesostyle short and inconspicuous; endostyle absent. Zooid 45 μm long \times 45 μm wide when contracted.

HABITAT. Freshwater, originally found attached to the crustacean *Pacifastacus lenisculus* (Jankowski, 1987).

Daurotheca ussurina Jankowski, 1987

DESCRIPTION (Fig. 192). Lorica somewhat rotund, 69–74 μm long \times 42–46 μm wide. Aperture 20–23 μm wide. Neck narrow. External stalk 7–8 μm long \times 3 μm wide; mesostyle short and broad; endostyle absent. Zooid 65 μm long \times 45 μm wide when contracted. Macronucleus C-shaped and lies horizontally in anterior part of zooid.

HABITAT. Freshwater, originally found attached to the crustaceans *Cambaroides*, *Cambarus*, *Orconectes* and *Pacifastacus* (Jankowski, 1987).

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INDEX TO SPECIES

The following is an annotated list of nominal species as well as an index of extant species.

Cothurnia

- C. acuta* Wang & Nie, 1933 = *Vaginicola wangi* (Wang & Nie, 1933) Kahl, 1935.
- C. acuta* Levander, 1915 (p. 26).
- C. affinis* Blochmann, 1886 = *Pyxicola pusilla* Wrzesniowsky, 1866) Trueba, 1978.
- C. affinis* Kahl, 1935 = *Cyclodonta bipartita* (Kahl, 1935) Matthes, 1958
- C. amoyensis* Wang, 1935 (p. 26).
- C. amphicteis* Lang, 1948 (p. 26).
- C. amphora* Kahl, 1928 = *Vaginicola amphora* Kahl (1928), 1935
- C. amphorella* Maskell, 1887 = *Vaginicola amphorella* (Maskell 1887) Kahl, 1935.
- C. angusta* Kahl, 1933 (p. 26).
- C. annulata* Stokes, 1885 (p. 26).
- C. anomala* Stiller, 1951 (p. 26).
- C. antarctica* (Daday, 1911) n. comb. (p. 27).
- C. aplatita* Stiller, 1939 (p. 27).
- C. aplatita* var. *flexa* Felinska, 1965 = *C. aplatita* n. comb.
- C. apseudophila* Lang, 1948 (p. 27).
- C. arcuata* Mereschkowsky, 1879 (p. 27).
- C. arenata* Kent, 1882 = *C. arcuata* (Kent, 1882) Zelinka, 1928.
- C. asimmetrica* Banina and Polyakova, 1977 (p. 27).
- C. astaci* Stein, 1854 (p. 27).
- C. asymmetrica* Sommer, 1951 (p. 27).
- C. auriculata* Stiller, 1939 (p. 29).
- C. auriculata* var. *flexa* Felinska, 1965 = *C. auriculata* n. comb.
- C. bavarica* Matthes & Guhl, 1973 (p. 29).
- C. bipartita* Stokes, 1885 = *Cyclodonta bipartita* (Stokes, 1885) Matthes 1958.
- C. brevistyla* Nenninger, 1948 (p. 29).
- C. butschlii* Zelinka, 1913 (p. 29).
- C. calix* (Wailles, 1928) Kahl, 1935 = *C. spissa* Fromentel, 1874 n. comb.
- C. canthocampti* Stokes, 1886 (p. 29).
- C. carinogammari* Stiller, 1953 (p. 29).
- C. carteri* Kent, 1881 = *Pyxicola constricta* Stokes, 1884 (Kahl, 1935).
- C. castellensis* Penard, 1914 = *Thuricola kellicottiana* (Stokes, 1887) Kahl, 1935.

- C. ceramicola* Kahl, 1933 (p. 29).
C. ceratophylli Penard, 1922 = *Vaginiola ceratophylli* (Penard, 1922) Kahl, 1935.
C. chaperoni Penard, 1922 = *Vaginicola chaperoni* (Penard, 1922) Kahl, 1935.
C. clausiens Stiller, 1951 (p. 31).
C. coarctata Kahl 1933 (p. 31).
C. cohnii (Cohn, 1866) Kent, 1881 (p. 31).
C. collaris Kahl, 1933 (p. 31).
C. collaris var. *incisa* Felinska, 1965 = *C. collaris*.
C. complanata Precht, 1935 (p. 31).
C. compressa Claparede & Lachmann, 1858 (p. 33).
C. compressa var. *compressula* = *C. felinska* (Felinska, 1965) n. sp.
C. compressa var. *cyathiformis* Felinska, 1965 = *C. cyathiforme* Stiller, 1939.
C. compressa f. *flexa* Wailes, 1928 = *C. compressa*.
C. compressa var. *ovata* Dons, 1922 = *Vaginicola ovata* (Dons, 1922) Kahl, 1935.
C. compressa var. *sinuosa* Wailes, 1943 = *C. compressa*.
C. compressula (Wailes, 1928) Kahl, 1935 = *C. compressa*.
C. cordylophorae Kahl, 1933 (p. 33).
C. corrugata Davis, 1879 = *Pyxicola socialis* (Trueba, 1978).
C. cothurnoides Blochmann, 1886 = *Pyxicola pusilla* (Trueba, 1978).
C. cratera Swarczewsky, 1930 = *Vaginicola cratera* Kahl, 1935.
C. crystallina sensu Entz, 1884 = *Vaginicola crystallina* (Entz, 1884) Kahl, 1935.
C. crystallina sensu Entz, 1904 = *Pseudothuricola dyonsii* pro parte (Entz, 1904) Trueba, 1980, and *Thuricola kellicottiana* pro parte (Entz, 1904) Trueba, 1980.
C. crystallina sensu Penard, 1922 = *Thuricola gracilis* (Penard, 1922) Trueba, 1980.
C. curva Stein, 1867 (p. 33).
C. curvula Entz, 1884 (p. 33).
C. curvula sensu Dons, 1922 = *Vaginicola curvula* (Dons, 1922) Kahl, 1935.
C. cyathiforme Stiller, 1939 (p. 33).
C. cyathus Jaworowski, 1893 = *C. maritima* Ehrenberg, 1838.
C. cyclopis Kahl, 1933 (p. 33).
C. cylidrica Sommer, 1951 (p. 33).
C. cypridicola Kahl, 1933 (p. 35).
C. cytherideae Kahl, 1933 (p. 35).
C. doliola Stiller, 1939, was originally described as a provisional species ('sp. prov.') and has yet to be designated species status.
C. doliolum Penard, 1914 = *Vaginicola doliolum* (Penard, 1914) Kahl, 1935.
C. dubia Stiller, 1939 was originally described as a provisional species ('sp. prov.') and has yet to be designated species status.
C. elastica (Penard, 1914) Kahl, 1935 = *Cothurniopsis valvata* Stokes, 1893.
C. elegans Stiller, 1940 (p. 35).
C. elegans Swarczewsky, 1930 = *Vaginicola elegans* (Swarczewsky, 1930) Kahl, 1935.
C. elongata Felinska, 1965 (p. 35).
C. elongata Fromentel, 1876 = *Vaginicola elongata* (Fromentel, 1876) Kahl, 1935.
C. endostyla Jankowski. Although this species was mentioned by Jankowski (1985), no description of it could be located.
C. entzi Kahl, 1933 (p. 35).
C. fecunda Stokes, 1893 (p. 35).
C. felinska (Felinska, 1965) n. sp. (p. 35).
C. fibripes Kahl, 1933 (p. 36).
C. flexa Kahl, 1935 = *C. compressa* Claparede and Lachmann, 1858.
C. floscularia Perty, 1852 (p. 36).
C. furcifer Hutton, 1878 = *Pyxicola pusilla* (Hutton, 1878) Trueba, 1978.
C. fusiformis Gourret & Roeser, 1886 = *C. arcuata* (Zelinka, 1928).
C. gammari Precht, 1935 (p. 36).
C. gigantea d'Udekem, 1864 = *Vaginicola gigantea* (d'Udekem, 1864) Kahl, 1935.
C. globosa d'Udekem, 1864 = *Vaginicola globosa* (d'Udekem, 1864) Kahl, 1935.
C. gracilis Kent, 1881 = *C. curva*.
C. halacaricola Precht, 1935 (p. 36).
C. harpactici Kahl, 1933 (p. 36).
C. havniensis Ehrenberg, 1838 = *Acineta compressa* Claparede and Lachmann 1859 (Curds, 1985).
C. hofkeri Kahl, 1933 = *C. innata* Müller, 1786.
C. imberbis Ehrenberg, 1831 (p. 26).
C. imberbis var. *limbata* Stiller = *Pyxicola limbata* (Stiller) Kahl, 1935.
C. incisa Daday, 1907 = *Thuricola incisa* (Daday, 1907) Trueba, 1980.
C. inclinans Felinska, 1965 (p. 36).
C. inflata Stokes, 1893 (p. 37).
C. inflecta Stiller, 1939 (p. 37).
C. innata Müller, 1786 (p. 37).
C. irregularis Kent, 1881 (p. 37).
C. kahli Banina and Polyakova, 1977 (p. 37).
C. kellicottiana Stokes, 1887 = *Thuricola kellicottiana* (Stokes, 1887) Kahl, 1935.
C. lapponum Penard, 1922 (p. 38).
C. lapponum naidongensis = *C. lapponum* Wang Jiaji, 1977.
C. lata Kellicott, 1883 (p. 40).
C. lata (sensu Wailes, 1928) Kahl, 1935 = *C. lata* Kellicott, 1883.
C. ligiae Cuénot, 1891 = *Pyxicola ligiae* (Cuénot, 1891) Kahl, 1935.
C. limnoriae Dons, 1928 (p. 40).
C. lobata Daday, 1907 = *Vaginicola lobata* (Daday, 1907) Kahl, 1935.
C. longipes Kellicott, 1894 (p. 40).
C. longipes (sensu Mereschkowsky, 1879) Kahl, 1935 = *C. longipes* Kellicott, 1894.
C. longipes sensu Voigt, 1902 = *Cyclodonta bipartita* (Stokes, 1885) Matthes, 1958.
C. macrodisca Stiller (p. 40).
C. magna Yunfen, 1980 (p. 40).
C. marina Andrussowa, 1886 = *C. maritima* Ehrenberg, 1838.
C. maritima Ehrenberg, 1838 (p. 40).
C. maritima sensu Möbius, 1888 = *C. mobiusi* (Möbius, 1888) Stiller, 1939.
C. membranoloricata Stiller, 1968 (p. 42).
C. minutissima (Penard, 1914) Kahl, 1935 (p. 42).
C. mobiusi (Möbius, 1888) Stiller, 1939 (p. 42).
C. mobiusi mihi (Möbius, 1888) Stiller, 1939 = *C. mobiusi*.
C. monoannulata Banina & Polyakova, 1977 (p. 42).
C. nebaliae Dons, 1928 = *Dimorphocothurnia nebaliae* (Dons, 1928) Jankowski, 1980.
C. nereicola Precht, 1935 (p. 42).
C. nitocrae Precht, 1935 (p. 42).
C. nodosa Claparede & Lachmann, 1858 (p. 44).
C. nodosa sensu Fromentel, 1874 = *C. irregularis* (Fromentel, 1874) Kent, 1881.
C. nodosa var. *longipes* Mereschkowsky, 1879 = *C. longipes* (Mereschkowsky, 1879) Kahl, 1935.
C. obliqua Bock, 1952 (p. 44).
C. oblonga Kahl, 1935 (p. 44).
C. operculigera Kent, 1869 = *Pyxicola operculigera* Kent (1869), 1881.
C. operculata Gruber, (1879), 1880 = *Thuricola valvata* (Gruber, 1879, 1880) Kahl, 1935.
C. ovalis (Wailes, 1928) Kahl, 1935 (p. 44).
C. ovata Fromentel, 1874 (p. 44).
C. oviformis Banina and Polyakova, 1977 (p. 44).
C. paguri André, 1910 = *Vaginicola paguri* (André 1910) Kahl, 1935.

- C. parallela* Maskell, 1887 = *Vaginicola parallela* (Maskell, 1887) Kahl, 1935.
- C. parva* Bock, 1952 (p. 45).
- C. parvula* Felinska, 1965 (p. 45).
- C. patellae* Hutton (1878), 1881 = *Mantoscyphidia patellae* (Hutton (1878), 1881) Jankowski, 1985.
- C. patula* Fromentel, 1874 (p. 45).
- C. pedunculata* Dons, 1918 = *C. trophoniae* Dons (1918), 1946.
- C. peloscolicis* Precht, 1935 (p. 45).
- C. plachteri* Matthes & Guhl, 1973 (p. 45).
- C. plectostyla* Stokes, 1885 (p. 45).
- C. poculum* (Wailes, 1928) Kahl, 1933 = *C. patula*.
- C. pontica* Mereschkowsky, 1881 = *Vaginicola pontica* (Mereschkowsky, 1881) Kahl, 1935.
- C. propinqua* Kahl, 1933 (p. 45).
- C. pupa* Eichwald, 1849 (p. 45).
- C. pupa* Cohn, 1866 = *C. cohni* (Cohn, 1866) Kent, 1881.
- C. pusilla* Wrzesniowski, 1870 = *Pyxicola pusilla* (Wrzesniowski, 1870) Kahl, 1935.
- C. putanea* Jaworowski, 1893 = *C. imberbis* Ehrenberg, 1831 (Kahl, 1935).
- C. pyxidiformis* d'Udekem, 1864 = *Pyxicola pyxidiformis* (d'Udekem, 1864) Trueba, 1978.
- C. pyxidiformis* var. *lacustris* Maggi, 1879 = *Pyxicola pyxidiformis* var. *lacustris* (Maggi, 1879) Trueba, 1978.
- C. recurva* Claparede & Lachmann, 1858 (p. 45).
- C. recurvata* Kahl, (p. 47).
- C. regalis* Penard, 1914 = *Thuricola valvata* Wright, 1858 (Trueba, 1980).
- C. rhabdota* Bock, 1952 (p. 47).
- C. rheotypica* Stiller, 1931 = *Cyclodonta bipartita* Matthes, 1958 (Felinska, 1965).
- C. richtersi* (Penard, 1914) Kahl, 1935 (p. 47).
- C. ruthae* Lüpkes, 1974 (p. 47).
- C. sahrhagei* (Sahrhage) Kahl, 1933 = *C. nodosa*.
- C. sediculum* Penard, 1914 = *Vaginicola sediculum* (Penard, 1914) Kahl, 1935.
- C. sieboldii* Stein, 1854 (p. 47).
- C. simplex* Kahl, 1933 (p. 47).
- C. sinuata* Kahl, 1933 = *C. minutissima*.
- C. sinuosa* (Wailes, 1943) n. comb. (p. 49).
- C. socialis* Gruber (1879), 1880 = *Pyxicola socialis* (Gruber 1879, 1880) Kent, 1881.
- C. soldida* Vuxanovici, 1962 (p. 49).
- C. spinosa* Labbé, 1895. Only a brief description of this species exists and it has never been figured. *C. spinosa* is therefore declared a *nomen nudum*.
- C. spissa* Fromentel, 1874 (p. 49).
- C. striata* Gourret & Roeser, 1886 = *Vaginicola striata* (Gourret & Roeser, 1886) Kahl, 1935.
- C. stylarioides* Precht, 1935 (p. 49).
- C. subglobosa* (Daday, 1911) n. comb. (p. 49).
- C. subtilis* Stiller, 1939 (p. 49).
- C. sulcata* Kahl, 1928 = *Vaginicola sulcata* Kahl (1928), 1935.
- C. tekirghiolica* Tucolesco, 1962 (p. 49).
- C. terricola* (Greeff, 1888) Penard, 1914 = *Vaginicola terricola* Greeff, 1888.
- C. thuricolae* Shubernetskii, 1978 = *Pyxicola thuricolae* (Shubernetskii, 1978) n. comb.
- C. triangula* Precht, 1935 (p. 51).
- C. trilobata* Sramek-Husek, 1957 = *Cyclodonta bipartita* Stokes, 1885 (Matthes, 1958).
- C. trophoniae* Dons (1918), 1946 (p. 51).
- C. trophonicola* Dons, 1946 (p. 51).
- C. vaga* Roux, 1901 (p. 51).
- C. valvata* (Stokes, 1893) Kahl, 1935 = *Cothurniopsis valvata* Stokes, 1893.
- C. valvata* Dons, 1922 = *Thuricola valvata* Dons, 1922 (Trueba, 1980).
- C. variabilis* Kellicott, 1883 (p. 51).
- C. variabilis* var. *emarginata* Kellicott, 1883 = *C. variabilis*.
- C. vas* Swarczewsky, 1930 = *Vaginicola vas* (Swarczewsky, 1930) Kahl, 1935.
- C. virgula* Penard, 1914 = *Vaginicola virgula* (Penard, 1914) Kahl, 1935.
- C. voighti* (Voigt, 1902) Mereschkowsky, 1933 = *Cyclodonta bipartita* Stokes, 1885 (Matthes, 1958).

Cothurniopsis

- C. annulata* (Stokes, 1885) Penard, 1922 = *Cothurnia annulata*.
- C. antarctica* Daday, 1911 = *Cothurnia antarctica* (Daday, 1911) n. comb.
- C. astaci* (Stein, 1854) Entz, 1884 = *Cothurnia astaci*.
- C. aurea* Gajewskaja, 1933 = *Vaginicola vas* (Swarczewsky, 1930) Kahl, 1935.
- C. canthocampii* Monard, 1919 = *Cothurnia canthocampii* Stokes, 1886.
- C. dionysii* Penard, 1914 = *Pseudothuricola dionysii* (Penard, 1914) Kahl, 1935.
- C. elastica* Penard, 1914 = *C. valvata* Stokes, 1893.
- C. entzii* Stiller, 1931 = *Pyxicola entzii* (Stiller, 1931) Kahl, 1935.
- C. longipes* Voigt, 1902 = *Cyclodonta bipartita* Stokes, 1885 (Penard, 1922).
- C. minutissima* Penard, 1914 = *Cothurnia minutissima* (Penard, 1914) Kahl, 1935.
- C. ovata* (Dujardin, 1841) Zelinka, 1928 = *Cothurnia ovata*.
- C. richtersi* Penard, 1914 = *Cothurnia richtersi* (Penard, 1914) Kahl, 1935.
- C. subglobosa* Daday, 1911 = *Cothurnia subglobosa* (Daday, 1911) n. comb.
- C. urceus* Gajewskaja, 1933 = *Vaginicola vas* (Swarczewsky, 1930) Kahl, 1935.
- C. valvata* Stokes, 1893 (p. 52).
- C. vej dovskii* (Vejdovski, 1882) Zelinka, 1928 = *Cothurnia oblonga*.

Cyclodonta

- Cyclodonta bipartita* (Stokes, 1885) Matthes, 1958 (p. 52).

Daurotheca

- D. marginata* (Kellicott, 1883) Jankowski, 1987 = *Cothurnia variabilis*.
- D. tespa* Jankowski, 1987 (p. 54).
- D. transoceanica* Jankowski, 1987 (p. 54).
- D. ussurina* Jankowski, 1987 (p. 54).
- D. variabilis* (Kellicott, 1883) Jankowski, 1987 = *Cothurnia variabilis*.

Dimorpho-cothurnia

- D. nebaliae* (Dons, 1928) Jankowski, 1985 (p. 54).

Semicothurnia

- S. acuta* (Levander, 1915) Jankowski, 1976 = *Cothurnia acuta*.
- S. amphictis* (Lang, 1948) Jankowski, 1985 = *Cothurnia amphictis*.
- S. nereicola* (Precht, 1935) Jankowski, 1976 = *Cothurnia nereicola*.

Sincothurnia

- S. apseudophila* (Lang, 1948) Jankowski, 1985 = *Cothurnia apseudophila*.
- S. auriculata* (Stiller, 1939) Jankowski, 1985 = *Cothurnia auriculata*.
- S. compressa* (Claparede and Lachmann, 1858) Jankowski, 1985 = *Cothurnia compressa*.

S. compressula (Wailes, 1928) Jankowski, 1985 = *Cothurnia compressa*.

S. cyathiformis (Stiller, 1939) Jankowski, 1985 = *Cothurnia cyathiforme*.

S. elongata (Felinska, 1965) Jankowski, 1985 = *Cothurnia elongata*.

S. flexa (Felinska, 1965) Jankowski, 1985 = *Cothurnia auriculata*.

S. gammari (Precht, 1935) Jankowski, 1985 = *Cothurnia gammari*.

S. imberbis (Ehrenberg, 1831) Jankowski, 1985 = *Cothurnia imberbis*.

S. isonica Jankowski. Although figured by Jankowski (1985), no description of this species could be located. *S. isonica* appears to resemble *Cothurnia tekirghiolica*.

S. monoannulata (Banina & Polyakova, 1977) Jankowski, 1985 = *Cothurnia monoannulata*.

S. paguri (André, 1910) Jankowski, 1985 = *Vaginicola paguri* (Kahl, 1935).

S. patula (Fromentel, 1874) Jankowski, 1985 = *Cothurnia patula*.

S. rhabdota (Bock, 1952) Jankowski, 1985 = *Cothurnia rhabdota*.

S. sinuosa (Wailes, 1943) Jankowski, 1985 = *Cothurnia sinuosa*.

Tesnotheca

T. limnoriae (Dons, 1928) Jankowski, 1987 = *Cothurnia limnoriae*.